The AUTOMOBILE

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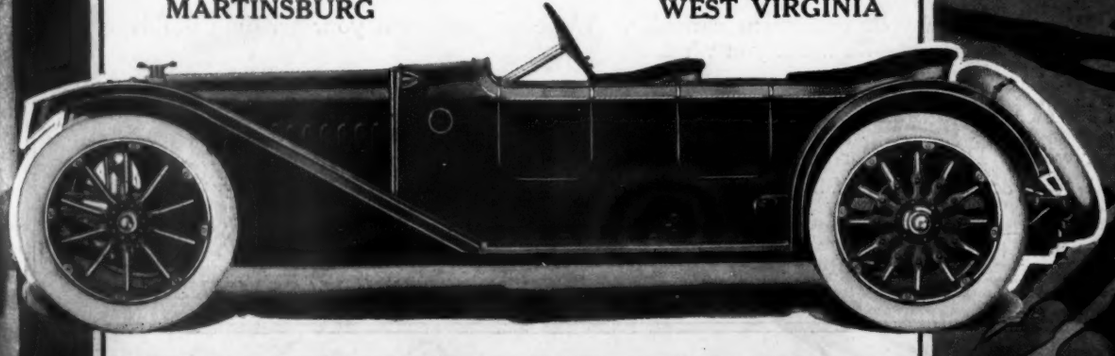

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The AUTOMOBILE

Cars Taxed on Unused Horsepower

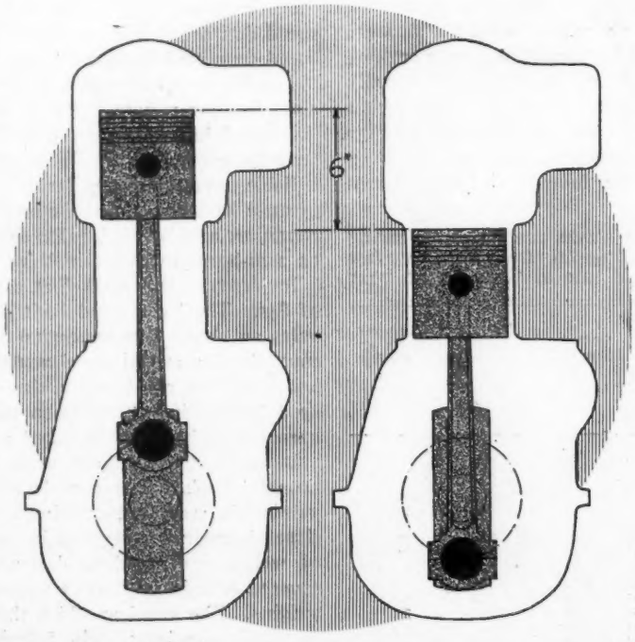
Motor Never Develops Rated Power When Traveling At Speed Permitted By Law

¶ *To be taxed by the state upon a certain piece of property and then to be forbidden to use that article would be impossible. Today in seventeen states the automobile owner is taxed according to the horsepower of his car and is then virtually forbidden to use it because the speed laws of the state will not permit the motor to be driven fast enough to develop the rated horsepower. A piston speed of 1,000 feet per minute is assumed in the formula used by the secretaries of state in calculating the horsepower. The average car when traveling fast enough to have 1,000 feet per minute of piston speed, would be going 35 miles an hour. The driver of that car would be fined.*

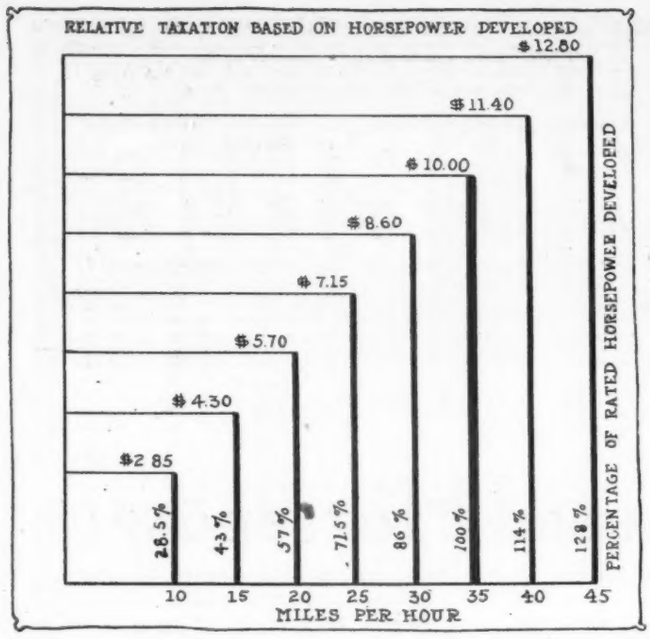
IF automobiles are to pay an annual registration tax based on their rated horsepower, then the horsepower formula used at present in establishing a car's power gives too high a rating, because with our present speed laws it is impossible to make use of the total horsepower given in the rating. This state of affairs is manifestly unfair to the automobilist.

Our speed laws will not permit you to drive fast enough to use it. If you observe the speed limits of the state in which you live you will rarely, if ever, utilize more than 57 per cent. of the horsepower you pay your annual registration upon. In other words, you are paying 43 per cent. too much registration tax. You are paying a tax on horsepower that the laws of the state will not permit you to make use of in average traveling.

Legislators have proceeded on the assumption that road destruction by an automobile is directly in proportion to the horsepower of the machine, but they forget that an automobile motor is capable of generating widely varying amounts of power and that the power generated is in direct proportion to the speed at which the engine works. If the speed of an engine, and by speed we mean the number of revolutions the crankshaft makes per minute, is 100 revolutions per minute, a certain horsepower is generated; double the speed and you will double the horsepower; treble the speed and your horsepower is increased three-fold. This ratio of increase continues until engine speeds of 1,500 revolutions per minute or more are reached, when, with not a few motors, the power fails to keep step with the increase in crankshaft revolutions. Then, in the language of the layman, the horsepower that an automobile consumes in traveling



The accepted horsepower formula presupposes a piston speed of 1,000 feet per minute. A motor with a 6-inch stroke as above, would travel a foot at each revolution—a thousand feet in a minute at 1,000 revolutions per minute



The tax for a 30-horsepower car in New York is $10. The above chart shows the maximum horsepower developed by such a motor at different speeds and what the tax should be if really based on the horsepower at definite speeds. A summons is often served in Greater New York for a speed of 15 miles an hour

along a highway always bears a direct relationship to the engine speed, and when you limit the speed of a vehicle on the highway you place a limit on the engine speed and curtail the amount of horsepower that the engine requires to generate.

In calculating official horsepower in the different states for computing the annual registration tax that an automobilist must pay, a formula familiarly known as the S. A. E. or A. L. A. M. formula is used. This formula has been used for years and has been official in Great Britain for many seasons. That it provides a satisfactory and just means of calculation is vouched for by the fact that several years ago in England a commission of the leading engineers was appointed to re-draft it to meet what were described as modern conditions. This committee, after making official tests of many hundreds of motors and delving generally into the subject, reported that no other method of calculation could be brought out that would meet the requirements and give general satisfaction to all better than the existing one.

This horsepower formula, given in a footnote, is based on two motor functions, first, the piston speed in feet per minute, and, second, the diameter of the cylinder. Piston speed must be appreciated to understand the horsepower rating. The diagram on the opening page explains it. It means the lineal distance in feet that each piston travels in a minute of time. With a motor with 6-inch stroke, the piston travels 6 inches plus 6 inches, or 1 foot, in each crankshaft revolution. If the motor is working at 100 revolutions per minute the piston speed is 100 feet per minute; if at 1,000 revolutions per minute then the piston speed is 1,000 feet per minute. If the motor stroke is 5 inches, the lineal piston travel is 10 inches per revolution and 833 feet per minute. In the formula in question the piston speed is assumed to be 1,000 feet per minute and the assumption is that the motor is working at such speed when it generates the horsepower given by the formula.

In seventeen states the rate of taxation is based on the S. A. E. or A. L. A. M. rated horsepower of the motor. According to careful measurements the actual horsepower required for average travel under level road conditions is 25 per cent. of this.

The S. A. E. horsepower is based upon a piston speed of 1,000 feet per minute. At this piston speed the average car would be covering ground at the rate of 35 miles an hour, a rate far in excess of that allowed by law, but nevertheless assumed as a basis of taxation. When traveling at the legal rate of speed, which in the majority of states is 25 miles an hour, the horsepower developed by the motor with wide-open throttle is a little over 70 per cent. of that rated, and the condition of wide-open throttle at this speed is only possible with antiquated cars or in hilly country.

For every revolution of the crankshaft, the piston makes a trip down the length of the stroke and then up the same distance. If the stroke of the motor is 6 inches, the piston travels a foot in each revolution. At a piston speed of 1,000 feet per minute the motor is making 1,000 revolutions per minute.

Speeds at which important cars attain the A.L.A.M. rating based on a piston speed of 1,000 feet per minute. Note how few develop this at the generally illegal rate of 30 miles an hour

Car	Stroke	A.L.A.M. Horsepower	Gear Ratio	Wheel Diameter	Feet per Minute, Piston Speed 30 Miles per Hour	Miles per Hour at 1000 Feet Piston Speed
Packard 48	5.5	48.2	3-1	36	770	38.9
Pierce 66	7	60	2.7-1	38	836	35.85
Alco 11-60	5.5	54.1	2.63-1	37	660	45.5
Buick 40	4.5	28.9	3.75-1	36	788	38.1
Cadillac	5.75	32.4	3.5-1	36	940	31.9
Chalmers 18	5.25	43.8	3.75-1	36	920	32.6
Cole 50	5.25	32.4	3.94-1	36	964	31.2
Fiat 56	6	45.95	3.5-1	37	898	33.4
Ford T	4	22.5	3.64-1	30	815	36.8
Hudson 54	5.5	40.9	3.43-1	36	882	34
Hupmobile 32	5.5	16.9	3.86-1	32	1111	27
Locomobile M	5.5	48.6	3.21-1	37	801	37.5
Metz 22	4	22.5	3-1	30	672	44.7
Pearless 37	7	60	2.6-1	38	805	37.3
R.C.H.	5	16.9	4.25-1	32	1108	27.1
Stuts 4	5.5	36.10	3-1	34	816	36.8
White	5.13	22.5	3-1	34	761	39.5
Overland 69	4.5	25.6	3-1	32	708	42.4

Tax Based on 30 Miles an Hour

A common practice in touring work is to have the gear reduction between the motor and the rear wheels at a ratio of 3 to 1. While the motor is making 1,000 revolutions the wheels are revolving 333 times. The circumference of a 34-inch wheel measures 8.9 feet. In 333 revolutions it covers a distance of 2,963 feet, or .57 mile—more than a half-mile a minute. This is the speed that the motor tax is based upon—much greater than the speed permitted by law.

The Fiat car has a stroke of 6 inches. At a piston speed of 1,000 feet per minute it travels at the rate of 33 miles an hour. The rated horsepower of the Fiat car is 45.95. In New York state the tax is $15. In Greater New York the owner of the car is liable to be summoned for driving over 15 miles an hour. The greatest horsepower that the motor could develop under any road condition, at this speed, using the S. A. E. rating, is 21. The tax on a 21-horsepower car in New York is $5.

In Vermont this same Fiat car would be taxed to the extent of $45. The legal speed limit on the roads of this state is 25 miles an hour. The maximum horsepower that the Fiat motor could develop at this speed would be 35. This is 10 horsepower less than that rated and is the maximum which could be used by a law-abiding citizen upon the roads of this state. This 10 horsepower, however, is taxed as much as the 35 he may use.

It has frequently been argued that the weight of the car should be taken into consideration in taxing the car. At the automobile races run at Dieppe, France, June 25 and 26, 1912, close observations were made upon the road to note the effect of weight and speed as destructive agents. The road circuit covered 48 miles and was traversed 564 times by cars of various weights. The speed at which these cars traveled averaged close to 60 miles an hour. The following points were noted:

1—The road was left in perfect condition on the straight lengths.

2—Where skidding in axial or lateral direction took place the surface was broken.

3—In cases of wheel slippage due to the use of excess power not absorbed in propulsion owing to insufficient traction, the road surface was cut.

These trials furnished conclusive proof, according to the report of M. Lumet, "That on a perfectly smooth road, the speed, the weight or the power have no destructive effect on the road. On the other hand, however, the ratio of the adhesive weight of the car to the available power of the driving shaft must be such that the car cannot skid. . . . . One should note, however, that the road surface was frayed at the bottom of inclines, just where the speed was changed for the upgrade."

If horsepower does not affect the road, it seems unfair to use it as a basis of taxation. The tax on motor vehicles has for its sole object the recompense of the state for the use of the roads and for the necessary clerical work attached to identification. If horsepower is used as a basis on account of its indirect bearing on road destroying factors, then that actually utilized by the different cars should be studied. In the accompanying table on this page is a list of typical cars and the speeds at which the piston velocity is 1,000 feet per minute. Note how the gear ratio affects this problem, the size of the wheel and the stroke of the motor. For purposes of illustration a column is devoted to the piston speed reached by these motors at a rate of 30 miles an hour. This is the speed permitted by the state of New York in the sparsely populated sections of the state. There are but two cars that attain 1,000 feet per minute piston speed at this rate. It is impossible within the law to make use of the horsepower used as a basis of taxation by the state with a high-powered car.

Present Tax Favors Small Cars

The small cars, like the Hupmobile and R. C. H., are taxed $5 in New York state. They approach the nearest to utilizing the full power at which they are registered. In certain sections of the state where they are permitted to travel at the rate of 30 miles an hour they do attain the high piston speed of 1,000 feet per minute, but what tourist races about the roads through these sections of the state at an average rate of 30 miles an hour? With these small cars, as in the larger models, the motor only reaches the speed used as a tax basis when in low gear.

It has been found from experience that the average speed made by touring parties on fair roads is very close to 18 miles an hour, regardless of the size or weight of the car. This includes the necessary slowing down for bad stretches in the road and for passing through villages. If this were used as the basis, the owner of a six-cylinder Pierce-Arrow car rated by the S. A. E. formula at 60 horsepower would be charged for 24 horsepower instead. The owner of a Ford car would be charged for 9 horsepower.

A situation has recently arisen which has rendered the horsepower basis for taxation a matter which is uppermost in the minds of automobilists as a class. For the past few years the ratio of the stroke of a motor to its bore has steadily been increasing. This year the average stroke-bore ratio for American motors was 1.22 against 1.17 of last year and this advance has been typical of the history of the past 5 years. The increase in the length of the stroke with the bore remaining the same has given an increase in horsepower.

Derivation of A. L. A. M. Formula

The indicated horsepower of a motor is equal to the mean effective pressure, times the piston area, times the piston speed, divided by 33,000 and also divided, in the case of a four-cycle motor by 4. In equation form this is expressed:

$$\text{I.H.P.} = \tfrac{1}{4}\,\frac{P\,A\,S}{33{,}000}$$

In the A.L.A.M. or S.A.E. formula the piston speed is assumed to be 1,000 feet per minute, for area A, we substitute its equivalent .7854 D^2, the pressure P is assumed to be 90 pounds and the mechanical efficiency 75 per cent. bringing in N, the number of cylinders we have

$$\text{B.H.P.} = \frac{90 \times .7854\ D^2 \times 1{,}000 \times N \times .75}{33{,}000 \times 4} = \frac{D^2 N}{2.489}$$

$$\text{or: B.H.P.} = \frac{D^2 N}{2.5}$$

States which tax on horsepower basis and the amounts for different horsepowers. These are based on the A.L.A.M. formula and in many instances the Secretaries of State are thinking of adopting a formula which will give a higher rating

STATE	TAX ON HORSEPOWER RATING				
	10	20	30	40	50
Alabama	7.50	12.50	17.50	20.00	20.00
Connecticut	5.00	10.00	15.00	20.00	25.00
Idaho	5.15	7.50	12.50	20.00	20.00
Illinois	4.00	4.00	6.00	8.00	10.00
Indiana	5.00	7.50	7.50	15.00	15.00
Kentucky	5.00	5.00	10.00	10.00	20.00
Maine	5.00	5.00	10.00	15.00	20.00
Massachusetts	5.20	5.20	10.00	15.00	15.00
Missouri	2.00	3.00	5.00	7.00	8.00
New Hampshire	10.00	15.00	15.00	20.00	25.00
New Jersey	3.00	5.00	5.00	10.00	10.00
New York	5.00	5.00	10.00	15.00	25.00
Oregon	3.00	3.00	5.00	7.50	10.00
Pennsylvania	5.00	10.00	10.00	10.00	15.00
Rhode Island	5.00	5.00	10.00	15.00	25.00
Vermont	10.00	20.00	30.00	40.00	50.00
Virginia	5.00	5.00	10.00	10.00	20.00

The makers of automobile engines have realized the gains made in the horsepower of which the motor is capable and some have come to the conclusion that the A. L. A. M. or S. A. E. formula no longer gives a just rating of their motors since it no longer approximates the maximum power it is possible to get from the motor on the block of the testing laboratory. They have not infrequently expressed themselves as dissatisfied with the formula and have offered tentative suggestions for new ones.

The secretaries of state have noted these remarks and have come to the conclusion in some instances that since the formula seemed to be too low for the maker it must be also too low for taxation purposes.

It must be remembered that the motor upon the block is a different proposition from the motor in the car. Few owners can keep the motor in the condition that it is in when on the blocks of the testing room at the home plant. Little changes of carbureter adjustment, valve timing, tappet clearance, etc., not to mention carbon accumulations, and the numberless other items which enter into the efficiency of the motor, cut down the power output. The S. A. E. formula may fall short of the motor on the blocks, but it is without exception in excess of what the motor is doing on the road.

A car driven over a level road at a rate of 20 miles an hour requires from 5 to 8 horsepower to maintain that speed. Why should the owner of that car be taxed for 30 or more horsepower?

What the automobile user has to contend with in Vermont. Under the most adverse conditions, traveling at the legal rate of speed he falls far short of the rated horsepower which is used as a basis of his taxation

Car	A.L.A.M. Horsepower	Horsepower at Legal Rate of 25 Miles per Hour	Present Tax $1 per A.L.A.M. Horsepower	Tax if Based on Horsepower Developed on Road at Legal Rate
Packard 48	48.2	30.9	$48	$30
Pierce 66	60	41.8	60	41
Alco 11-60	54.1	29.7	54	29
Buick 40	28.9	19.3	28	19
Cadillac	32.4	25.4	32	25
Chalmers 18	43.8	33.6	43	33
Cole 50	32.4	26.1	32	26
Fiat 56	45.95	34.4	45	34
Ford T	22.5	15.25	22	15
Hudson 54	40.9	30.1	40	30
Hupmobile 32	16.9	15.6	16	15
Locomobile M	48.6	32.4	48	32
Metz 22	22.5	12.6	22	12
Peerless 37	60	39.5	60	39
R.C.H.	16.9	15.6	16	15
Stutz 4	36.1	24.0	36	24
White	22.5	14.6	22	14
Overland 69	25.6	13.4	25	13

Who Defends New York Tire-Dating Bill?

No One Claims Responsibility at Hearing—Illinois Also Afflicted with Similar Bill—Much Automobile Legislation in Other States

NEW YORK CITY, March 25—A hearing was given on the tire dating bill at Albany last Thursday before the Senate Committee on Miscellaneous Corporations. Several of the large tire companies sent their representatives and the others were represented by Sidney S. Meyers, Jr., who is acting as counsel for all the large tire companies in the country in fighting this objectionable measure.

In the course of the hearing the tire manufacturers vainly endeavored to ascertain who wanted the bill passed, in what way the bill would better existing conditions in the tire industry and, in a word, why this bill, which was supposedly peacefully laid to rest last March, has been resurrected.

The members of the committee seemed to be absolutely ignorant of the bill on which they were supposed to pass. As to the state of mind of some of the members of the committee, only three out of seven of whom were present, by the way, the following conversation is illuminating:

Mr. Meyers: May I ask, Senator Stilwell, what the real object of this bill is?

Mr. Stilwell: I know nothing about the bill.

Mr. Meyers: May I ask you, Senator Sullivan, what the real object of this bill is?

Mr. Sullivan: You will have to ask the introducer, Mr. Oxford. (Mr. Oxford, it was stated, was then in New York.)

The bill in question was introduced in the Senate on January 20, 1913, by Senator Sullivan, chairman of the above committee, who afterwards gave the bill to Mr. Oxford, to introduce in the Assembly, which was done on February 17, 1913. Thus the statement made by Mr. Sullivan, "You will have to ask the introducer, Mr. Oxford," is an example of the old game "button, button, who has the button?"

Mr. Meyers brought up the point that the bill is unconstitutional because it is class legislation, stating that:

"It provides for the dating of tires for use on motor-propelled vehicles and thus excludes tires for use on buggies, baby carriages and bicycles.

Senator Stilwell distinguished himself by replying as follows:

"You say it takes out a class and puts it on motor vehicles only. Are they not the only dangerous class of vehicles? Baby carriages are not as dangerous as motor vehicles, are they? Let's be sensible men."

Among the numerous remarkable statements made by the members of the committee the following passage, taken from the official record, is exceedingly illuminating in regard to the status of the men who represent the people of the Empire State at Albany:

Mr. Meyers: In order to be fair, you must keep in mind your specific powers.

Mr. Stilwell: We make the law.

Mr. Meyers: But you are not above the Constitution.

Mr. Stilwell: Yes, sir, we make the law.

If the authorities at Albany permit this uncalled-for measure, which will work so much harm to the legitimate tire manufacturers, to be enacted into law it will conclusively prove that something is wrong. The tire companies are putting up a manly, straightforward fight against the passage of the bill, although it seems practically impossible to find anyone who is in favor of the passage of such a measure.

The makers are determined to fight the passage of the bill to the limit and if it is passed over their opposition, they will carry the matter to the courts.

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CHICAGO, ILL., March 22—A bill fashioned along the lines of the one that is before the New York solons, which will require that all tires made or offered for sale in the State of Illinois be stamped with the date of manufacture and also dated when repaired, etc., has been offered at Springfield by Senator Manny and referred to the committee on parks and boulevards. The bill is a short one and the interesting part of it says:

> It shall be unlawful, within this state, for any person, firm or corporation to sell, resell, or otherwise dispose of, any tire to be used on any motor vehicle unless the same shall have been properly stamped, clearly and legibly, and in the English language, with a die, and in such manner, designated thereon, the date when such tire was originally manufactured or made, and when, if such be the condition, such tire was repaired, with the date of such repair, and whether the same is a new or second-hand tire, and when or not the same had previously been used, and such tire, when new, shall have a tag pasted thereon, showing the ingredient, composite and component parts thereof.
>
> A fine of not less than $50 and not more than $200 shall be imposed for each offense.

Minnesota has a tire-stamping law, which, however, is not enforced, it being claimed that the authorities recognize that it is unconstitutional. The tire manufacturers, it is understood, have long wanted to make a test case in the Gopher State, but have had no opportunity.

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Colorado Gets Highway Commission

DENVER, COL., March 21—Motorists and good roads promoters throughout Colorado are elated over the enactment of a law creating a highway commission and setting aside a fund of $750,000 for the construction and improvement of roads. The bill has been passed by the legislature and signed by Governor Ammons, and contains a clause putting it into effect immediately.

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Iowa Insurance Bill Passes One House

DES MOINES, IA., March 22—A bill providing insurance against losses sustained by owners of automobiles in accidents passed the Iowa house of representatives this week. As originally introduced, the bill provided for insurance to indemnify the automobile owner driving his own car against damages he might incur as results of an accident. Before passed, however, the bill was amended so that the person or property injured may have the first right to bring suit against the insurance company, and receive his claim, if just, before the insured shares in the benefits of the policy.

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Lippincott for Interstate Licensing

TRENTON, N. J., March 25—Job H. Lippincott, State Motor Vehicle Commissioner of New Jersey, dissatisfied with the results of the reciprocity licensing system as now used in that state, is proposing a system differing very much from all in use at present. At present, while New York and New Jersey have full reciprocity, the number of New York cars touring in New Jersey is very large and Jersey's roads are depreciated without anyone paying for them.

The proposed system of Commissioner Lippincott is claimed to be automatic in regulation and revenue, including as it does but one registration and making interstate travel possible without annoyance or delay.

The foundation of the scheme is an interstate license issued by the state in which the automobilist resides. The license tag is so designed as to denote the state in which the car is owned, and the license is to be charged for proportionately to the horsepower of the machine. The fee is to be assigned to the state in which the car is owned and if the license is to be extended for travel in any other state or states, an additional fee representing a percentage of the home license fee is to be charged for each additional state. It would then be necessary for the motor vehicle office of the home state to notify the state or states, for which extensions have been granted, of the licensing of the car, giving the number, color, etc., of the tag and forwarding to the foreign state a check for the amount paid for the license extension. It would, of course, remain for the state where the extension holds good to suspend or revoke the license. Each state should use all the money received from automobile licensing for road improvements.

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Family Licenses for Delaware

WILMINGTON, DEL., March 20—Under a bill passed a few days ago and which went into effect yesterday, when it was signed by Governor Miller, family operators' licenses are now obtainable, at a cost of $8 per annum. Heretofore each operator, no matter how many there were in a family, had to have a separate license at $5 a year.

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Ohio Representatives Pass Bills

COLUMBUS, O., March 24—The Hite bill is the most important of a number of bills passed in the Ohio house of representatives last week. It provides for a yearly levy of .5 mill for a period of 10 years for the improvement of the highways. The bill, if enacted into a law, will produce $36,000,000 in 10 years. Of the amount raised by the levy, 25 per cent. is to be used in building the market road system and 75 per cent. in building the system of inter-county roads.

Another bill was passed establishing the Portage plan in Ohio. This provides that any association, concern or individual may subscribe 10 per cent. and the county 90 per cent. toward the improvement of any road.

A bill was passed compelling township trustees to drag every road at least two times yearly with a split-log drag.

Still another bill was passed to take the place of the Garrett law, which had been invalidated by the Supreme Court; the new measure provides that in the improvement of roads abutting property owners may pay 10 per cent., the township 15 per cent., the county 25 per cent. and the state 50 per cent.

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Detroit Cars Facing Taxation Scheme

DETROIT, MICH., March 25—Detroiters are fighting the proposed motor car tax law, which seeks to impose a specific state tax on motor cars, rather than a local tax. Mayor Marx and several of the city assessors have recently appeared at Lansing to speak against the bill and have offered facts to show that for the coming year the city will lose about $200,000 in taxes if the bill becomes a law. There are about 8,000 privately owned automobiles in the city and the tax derived therefrom last year amounted to $188,640, based on an average valuation of $1,050 per car.

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Only $2 Fee for Federal Officials

WASHINGTON, D. C., March 24—*Special Telegram*—Under the ruling of corporation counsel, members of Congress and executive officers of the federal government who are legal residents of other states, will not be compelled to conform to the new automobile regulation imposing upon non-residents the same fee as is assessed by their home state against district automobilists.

The question arose in connection with the application of Senator Gallinger, of New Hampshire, for a district automobile license. Corporation Counsel Thomas informed H. M. Woodward, secretary of automobile board, that, for the purpose of obtaining a license to use his automobile here, it has been decided that Senator Gallinger is a resident of the District.

In view of this decision the commissioners today approved the recommendation that members of Congress and executive officers of the government, who are required by law to conduct their official business in Washington, be considered resident of the District for the purpose of this regulation. The cost to them for a license will be $2.

The regulation was aimed principally at the Maryland authorities, who have refused to enter into reciprocal arrangements with the District for the use of the roads by automobilists. Under it non-resident applicants for an automobile license are required to pay the same fee as is charged by their state against residents of the District.

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Illinois Government Favors Good Roads

CHICAGO, ILL., March 24—That the men at the head of governmental affairs in the State of Illinois are in favor of legislation looking toward a permanent system of good roads in the commonwealth was made plain by William McKinley, speaker of the state legislature, at the good roads dinner held Saturday night under the auspices of the good roads committee of the Chicago Association of Commerce at the Hotel Sherman.

Speaking for Governor Dunne, Speaker McKinley said that while not committing himself as to the relative merits of any of the four or five bills under consideration in the legislature, he was heartily in favor of road improvement in the state. But he was not prepared to say what method to pursue to obtain them. He suggested a campaign of letters to the legislature when the favorite bill came up.

Thirty different organizations of business men throughout the state were represented at the dinner. In addition, the 40,000 clubwomen of the state had their hearing in the person of Mrs. F. W. Blocki, of Chicago. Henry Paulman spoke for the automobilists and Edwin R. Wright, president of the State Federation of Labor, spoke for organized labor in the interest of the use of convicts on road work. The pleas of the rural letter carriers, farmers and truck gardeners and the school teachers in favor of state highway improvement were presented by representatives of their organizations. A plan as outlined in a good roads bill was presented by Richard Finnegan, secretary of the Illinois State Highway Improvement Association and received the indorsement of the meeting.

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Truck Club Against McAneny Scheme

NEW YORK CITY, March 20—At the monthly meeting of the Motor Truck Club last night the proposed vehicle taxation measure conceived by Borough President McAneny of Manhattan was discussed. This scheme proposed to tax vehicles according to the load carried by its wheels, the reason given being the destruction of city pavement by automobiles. According to the proposed fee schedule some big trucks would have to pay as much as $1,000 a year. The truck club members recognized that the enactment of the measure would greatly handicap the truck business and the use of trucks in New York, while the conclusion was reached that by specifying a minimum tire width the pavement could be sufficiently protected.

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GRAND RAPIDS, MICH., March 25—The Supreme Court of Michigan has held unconstitutional the clause in the state automobile law of 1909, which makes the owner of a motor vehicle liable for any injury occasioned by the negligent operation, by any person, of the owner's automobile. This is a distinct victory for the motorists of the state. This does not affect chauffeurs, who are held to be paid servants of the car owner, who is strictly responsible for such employee's actions while the vehicle is under his control.

Price-Cutting on Patented Article Is Infringement

Decision to That Effect Handed Down in United States Supreme Court of Great Importance

CHICAGO, ILL., March 25—Word was received here from Washington today of a decision, to the effect that a dealer selling patented articles at cut prices anywhere within the jurisdiction of the Circuit Court of Appeals at Chicago is liable for infringement of patent, had been handed down in the United States Supreme Court. This will undoubtedly have a bearing on the future sale of automobile accessories.

Whether the construction of the law now in force in Chicago is to be the law of the entire country hangs on the decision in another case now pending before the supreme court involving a broader question than that in the case decided. This case, which has been advanced for argument April 7, is a suit for infringement of patent brought by a patent medicine manufacturer against a Washington druggist for ignoring the stipulation on the label which states that the nostrum could not be sold for less than a given price. In the lower courts the claims were not allowed and the court of appeals of the District of Columbia has now asked the supreme court for instructions.

The Fair Department Store was made a defendant in the old Circuit Court of Chicago by the Kohler Die & Specialty Co. in a suit for damages because of the sale by The Fair of a gas-heating device which the Kohler company controlled under a patent. The question tried was whether The Fair had violated any law in selling the devices for $1.25 each, whereas the Kohler company manufactured them for sale at $1.50 and attached a notice to each device imposing the condition that the device shall not be sold at less than $1.50.

According to Walter Chamberlin, who took the appeal to the supreme court for the defendant the supreme court has affirmed the decision of the circuit court of appeals that patentees could include in their patent notice a fixed sale of price. Attorney Chamberlin argued that the circuit court went without its jurisdiction in making such a decision, which he held was against public policy, established a monopoly, and was a violation of the Federal Constitution.

The decision of the supreme court in this case is at variance with a decision handed down in the United States district of New York in February when the judge held that patented articles may not be sold at a fixed price.

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DETROIT, MICH., March 26—F. R. Bump, assistant general manager of the R-C-H Corporation, has resigned. J. F. Hartz, president of the corporation, will take charge of Mr. Bump's duties for the present.

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$450,000 Company to Make Hearses

GRAND RAPIDS, MICH., March 20—The Michigan Hearse & Automobile Co., capitalized at $450,000, was organized here today for the manufacture of motor trucks, with motor hearses a special line, and horse drawn hearses.

The new firm, which is among the first to specialize in the building of motor hearses, is a merger of interests of the Michigan Hearse & Carriage Co., which has been in business here for the past 10 years, and the Grand Rapids Motor Truck Co., manufacturers of 1.5 ton commercial vehicles, which removed to Grand Rapids from Decatur, Ind., about 1 year ago.

The present working forces of forty men at the hearse factory and fifty-five at the truck plant will be at once augmented to 160 men.

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INDIANAPOLIS, IND., March 14—At their regular annual meeting, held at the plant in this city, recently, the stockholders of the American Motors Co. re-elected the entire board of directors and the following officials: J. I. Handley, president; D. S. Menasco, vice-president; J. D. Bright, treasurer; V. A. Longaker, chairman of board and general manager.

Automobile Securities Quotations

No definite trend can be said to have prevailed through the past week, and the number of advances were about equal to that of losses. The principal influence of recent weeks, namely, the Akron strike, having been practically eliminated, the tire stocks regained much of their former strength, Goodyear common advancing 15 points, Goodrich common 4, Fisk common 3 1-2, Miller 5, U. S. Rubber 2 and Swinehart 7. Firestone common, however, dropped 5 points. Among automobile manufacturing securities Chalmers was notable for its advance of 5 points, while Pope dropped 3, Willys-Overland 6, U. S. Motor first preferred 23 and second preferred 35. The comparative tabulation for 1912 and 1913 follows:

	1912		1913	
	Bid	Asked	Bid	Asked
Ajax-Grieb Rubber Co., com	..	..	150	160
Ajax-Grieb Rubber Co., pfd	..	..	95	100
Aluminum Castings, pfd	..	..	95	99
American Locomotive Co., com	38½	39½	34½	35
American Locomotive Co., pfd	107½	108½	104	107
Chalmers Motor Company, com	..	..	120	135
Chalmers Motor Company, pfd	..	..	100	102½
Consolidated Rubber Tire Co., com	12	20	15	20
Consolidated Rubber Tire Co., pfd	30	40	..	79
Firestone Tire & Rubber Co., com	233	236	265	275
Firestone Tire & Rubber Co., pfd	108	110	103	106
Fisk Rubber Co., com	..	..	..	..
Fisk Rubber Co., pfd	..	..	103	106
Garford Company, preferred	..	..	95	100
General Motors Company, com	30	30½	28	33
General Motors Company, pfd	77	77½	76½	77½
B. F. Goodrich Company, com	..	..	31½	32½
B. F. Goodrich Company, pfd	..	..	94	96½
Goodyear Tire & Rubber Co., com	396	400	360	370
Goodyear Tire & Rubber Co., pfd	108	110	102½	103½
Hayes Manufacturing Company	..	..	..	90
International Motor Co., com	..	..	5	10
International Motor Co., pfd	..	..	35	45
Lozier Motor Company	..	..	..	25
Miller Rubber Company	..	..	180	195
Packard Motor Company	104	107	98	102
Peerless Motor Company	..	..	115	130
Pope Manufacturing Co., com	37	40	17	22
Pope Manufacturing Co., pfd	78	80	62	68
Reo Motor Truck Company	8	10	11½	12½
Reo Motor Car Company	23	25	20½	21½
Rubber Goods Mfg. Co., pfd	100	105	104	106
Studebaker Company, com	..	..	28½	29
Studebaker Company, pfd	..	..	88	93
Swinehart Tire Company	..	..	95	102
U. S. Motor Co., com	..	..	..	8
U. S. Motor Co., 1st pfd	..	..	..	10
U. S. Motor Co., 2nd pfd	..	..	..	30
U. S. Rubber Co., com	52½	53	61½	62
U. S. Rubber Co., 1st pfd	113½	114	104½	105½
White Company, preferred	..	..	103	108
Willys-Overland Co., com	..	..	56	63
Willys-Overland Co., pfd	..	..	90	98

McLaughlin Wins from Grand

WASHINGTON, D. C., March 24—The Interstate Commerce Commission has handed down an opinion in the complaint of the McLaughlin Motor Car Co., Ltd., vs. the Grand Trunk Railway Co., of Canada, *et al.*, in which it is alleged that unjust and unreasonable charges were made for the transportation of automobile parts from Flint, Mich., to Oshawa. The commission found that the rates charged were unreasonable and ordered reparation paid to the complainant. In its opinion the commission said it did not believe that automobile chassis knocked down should be charged as high a rate as that provided for chassis set up or for complete automobiles.

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Yale & Towne Company Sues Dealers

NEW YORK CITY, March 25—The Yale & Towne Mfg. Co., of this city, has filed suit against the General Automobile Supply Co. and Smith-Haines, both of this city, for alleged violation of the Yale & Towne trademark. The bill of complaint charges that the defendants in both suits sold locks, stating them to be of the Yale type. Inasmuch as the name Yale is protected legally, the complainant holds that this alleged practice on the part of the defendants is illegal and the Yale company prays for injunctions preventing the defendants from continuing the sale of such locks, as well as an accounting of the business done in these products.

Market Changes of the Week

Tin proved to be the most important change in the markets this week, gaining $.63 per hundred pounds. Under the influence of the better London cables the market here was firm and higher yesterday, but without any great show of activity on the part of operators to either buy or sell, and at the close the market was inactive though firm. A steady business was reported in lead here yesterday on the basis of $4.35 per hundred pounds. Both electrolytic and Lake coppers suffered losses of $.00 1-8 per pound. Beyond a moderately good demand from consumers, there is but little change to note in the copper situation here. Leading sellers claim a steady run of good buying orders, and buying may be viewed as of very fair proportions. Domestic scrap rubber remains in a firm position. A moderate demand continues to be received from reclaimers and fair-sized clearances are still noted to various foreign countries. Collections are reported to be light and stocks are comparatively rather light. Automobile tire scrap rubber is calling at $.09 7-8 per pound. Cottonseed oil rose $.05. The oil market has shown so much firmness of late that some of the traders thought it about time for a moderate reaction and were afraid to pursue the buying side any further.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Change
Antimony, lb.....	.07⅝	.07⅝	.07⅝	.07⅝	.07⅝	.07⅝	.....
Beams & Channels, per 100 lbs.....	1.61	1.61	1.61	1.61	1.61	1.61	.....
Bessemer Steel, ton.	29.00	29.00	29.00	29.00	29.00	29.00	.....
Copper, Elec., lb...	.14⅞	.14¾	.14¾	.14⅞	.14⅞	.14¾	—.00⅛
Copper, Lake, lb...	.15	.14⅞	.14⅞	.14⅞	.14⅞	.14⅞	—.00⅛
Cottonseed Oil, bbl.	6.37	6.40	6.38	6.38	6.40	6.42	+.05
Cyanide Potash, lb..	.19	.19	.19	.19	.19	.19	.....
Fish Oil, Menhaden, Brown	.33	.33	.33	.33	.33	.33	.....
Gasoline, Auto, 200 gals.....	.22¼	.22¼	.22¼	.22¼	.22¼	.22¼	.....
Lard Oil, prime....	.90	.90	.90	.90	.93	.93	+.03
Lead, 100 lb.....	4.35	4.35	4.35	4.35	4.35	4.35	.....
Linseed Oil.....	.47	.47	.47	.47	.47	.47	.....
Open-Hearth Steel, ton.....	29.00	29.00	29.00	29.00	29.00	29.00	.....
Petroleum, bbl., Kansas crude....	.88	.88	.88	.88	.88	.88	.....
Petroleum, bbl., Pa., crude.....	2.50	2.50	2.50	2.50	2.50	2.50	.....
Rapeseed Oil, refined	.68	.68	.68	.68	.68	.68	.....
Silk, raw Italy....	....	4.30	....	....	4.30	4.35	+.05
Silk, raw Japan....	....	3.70	....	....	3.70	3.70	.....
Sulphuric Acid, 60 Baumé.....	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lb.....	46.00	46.13	46.13	46.20	46.22	46.63	+.63
Tire Scrap.....	.09⅞	.09⅞	.09⅞	.09⅞	.09⅞	.09⅞	.....

Trunk and Fisk from Thropp

CHICOPEE FALLS, MASS., March 26—Justice Hale in the U. S. Court of Appeals, First District, a few days ago affirmed the decision of the district court declaring the patent No. 822,561 issued June 6, 1906 to P. D. Thropp, void and invalid, on the grounds of anticipation. The De Laski & Thropp Circular Woven Tire Co. thus lost to the Fisk Rubber Co., of this city, whom they had sued for infringement of the above-mentioned patent during the past 4 years.

The patent covers the form of mold used in the making of Fisk one-cure, wrapped-tread tire casings.

Buick Sues Père Marquette on Rates

WASHINGTON, D. C., March 24—The Buick Motor Car Co., Flint, Mich., has filed complaint with the Interstate Commerce Commission against the Père Marquette Railroad Co., charging the imposition of unjust and unreasonable rates from Flint, Mich., to Richwood, O. The complaint charges that rates fixed by defendant company on automobile shipments from Flint to Richwood are in excess of those charged to Dayton from Flint on the same road and further by 70 miles than to Richwood. It is alleged that competing lines charge 40 cents less on the hundred on automobiles for similar distances. Reparation to the sum of $53.30 is asked.

Merger of Flanders and Maxwell Completed

Detroit, Dayton and Tarrytown Plants of the Organization Rapidly Resuming Capacity Production

DETROIT, MICH., March 25—As a final action in the merger of the Flanders Motor Co. of this city, with the Maxwell Motor Co., Inc., the holders of stock in the former were last week given shares in the parent concern on the basis of about half a share of Maxwell preferred stock, and one each of second preferred and of common stock for each share of Flanders stock.

Following the usual procedure in such negotiations, the books of the Flanders company were completely gone over and audited and the plant and stock inventoried before the formal transfer was made, which accounts for the delay. All Flanders liabilities are assumed by the Maxwell Motor Co., and all its indebtedness squared away.

The plants here, namely the Flanders, Brush and Alden Sampson plants, are not operating to capacity yet but men are being taken on as rapidly as possible and before long some 9,000 men will be employed. The Dayton, O., plant where Stoddard-Daytons were formerly made and the Tarrytown, N. Y., factory, old home of the original Maxwells, are also taking on many employees and settling down to serious business.

Chandler Buys Factory Site

CLEVELAND, O., March 25—The Chandler Motor Co., of this city, closed a deal yesterday with the Belt & Terminal Realty Co., for 6 acres of land on the Belt line of railroad for a factory site. The ground is located at St. Clair and 131st streets. The company is already pushing plans ahead to erect a concrete and steel fireproof factory which will be completed by July 1. This factory will be 120 by 420 feet. The company is making rapid progress with its Chandler light six on which shipments will begin July 1. Already distributors have contracted for a large portion of the first year's output and indications are favorable for an encouraging reception of the new car by the country at large.

Dunlop Company to Double Capital

TORONTO, ONT., March 22—The Dunlop Tire & Rubber Goods Co. is to double its preferred capital, and with this object in view they will issue $300,000 worth of preferred shares. In addition to the $293,000 preferred stock now paid up (7,000 shares of the original issue authorized having been cancelled) there are outstanding $700,000 and $500,000 in bonds. It is the intention to apply later to the Montreal and Toronto Exchanges to have the entire preferred listed. The operations of the company embrace the whole of Canada, branches having been establishd in no less than eleven of the leading cities. Since 1905 the sales have increased from $369,362 until last year they reached an aggregate of $2,310,585. For 14 years a dividend of 7 per cent. per annum has been paid semi-annually on the preferred stock, the total distribution in this way reaching $285,520.86.

Batavia Issues $100,000 in Stock

NEW YORK CITY, March 24—The Batavia Rubber Co., Batavia, N. Y., capitalized at $500,000, is issuing $100,000 worth of 6 per cent. preferred stock, the total stock of that class amounting to $250,000. The company has a surplus of $62,754. The added capital is needed for expansion purposes.

Finnegan Buys Bulk of Thomas Company Property

Total Realized at Auction from Thomas Assets Was $256,400—Finnegan May Manufacture Cars

A. A. A. Opens Washington Branch—New York Stoddard Dealers Bankrupt—Grand Palais Dilapidated

BUFFALO, N. Y., March 22—This afternoon at 5 o'clock auctioneer Conant disposed of the last article in the auction of the property and stock-in-trade of the E. R. Thomas Motor Car Co., 1192 Niagara street. The sale opened Monday, March 17. About 400 bidders were in attendance on each day but the bidding on the articles was not exceptionally heavy, although the entire sale brought good returns.

Fifteen of the Thomas cars went at $1,900 each. These and most of the other articles were bought by Mr. Finnegan of Depew. Although the price officially bid and paid for lot one of the Thomas stock by Mr. Finnegan, was $51,000, he paid $5,360 additional for other machinery, working tools, lathes and other material not included in the first lot.

Immediately after the sale, Mr. Finnegan, who is president of the Empire Smelting Co., and who previously had purchased the patents, patterns and stock-in-trade of the Thomas factory including machinery, tools, lathes and other articles, stated to THE AUTOMOBILE representative that he would carry along the Thomas product in much the same manner as did the Thomas officials. This led to the belief that Mr. Finnegan, who formerly headed a motor car company in Louisville, Ky., is about to make a second incorporation in the automobile field but for the present Mr. Finnegan prefers not to discuss his plans for the immediate future. However, he hinted that he was about to manufacture automobiles but where he would not say.

Mr. Finnegan also bought the famous New York to Paris racer for $200. The famous New York-Paris trophy, also bought by Mr. Finnegan, brought $300, or $100 more than the racer that won it.

Lot No. 2 of the assets of the Thomas Motor Car Co. was disposed of for $6,000 to the Shiffman Iron & Metal Co., Detroit, Mich.

The entire receipts from the sale of the Thomas assets aggregated $256,400, divided as follows: Monday, $84,500; Tuesday, $17,400; Wednesday, $72,200; Thursday, $49,300; Friday, $11,300; Saturday, $21,767. About 2,000 persons attended the sale during the 6 days. Registered for the sale from the various states were the following number of men: New York State (outside of Buffalo), thirty-six; Michigan, seven; Pennsylvania, twenty-nine; Indiana, six; Missouri, four; Rhode Island, three; Illinois, eleven; Maryland, one; Montana, one; Delaware, one; Minnesota, four; England, six; New Jersey, four; Kansas, one; Ohio, eighteen; Maine, one; Connecticut, four; Massachusetts, nine.

Post Office Bids to Open Next Week

WASHINGTON, D. C., March 24—(*Special Telegram*)—About April 1 the officials of the post office department will call for bids for furnishing the service for carrying mails in various Eastern cities. Regarding the use of motor vehicles the call for bids will say:

Proposals to perform service in any of the routes named in automobiles, of such style and construction as may be acceptable to the second assistant postmaster general, instead of in wagons drawn by horses, will be received. Each proposal must be accompanied with statement giving description of motor vehicle it is proposed to use, with horsepower of engine and speed per hour that will be made.

In the event of a proposal for automobile service being accepted, the department reserves the right to rearrange the schedules shown in the advertisement for route, and to change the running time, so as to provide schedules better adapted to the more expeditious mode of transportation.

The department reserves the right to reject any or all of such proposals.

In New York the call will be for eighty motor vehicles capable of carrying 6,000 pounds and twenty motor vehicles to carry each 3,000 pounds. The post office department will answer all inquiries about the proposed service.

A. A. A. to Open Washington Branch

NEW YORK CITY, March 25—The American Automobile Association will open branch headquarters in the Riggs Building, Washington, D. C., April 1. This move has been contemplated by the executive board for several months, in fact, since the movement for national construction and maintenance of highways took definite form. It is the intention of A. G. Batchelder, chairman of the executive board, to spend approximately one-half of each week at this branch.

Next Week Busy One for S. A. E.

NEW YORK CITY, March 26—During the coming week the Society Automobile Engineers will conduct a considerable amount of business. On April 1, during the morning the council meeting of the society will be held at the headquarters of the Metropolitan section, 1784 Broadway, while in the afternoon the fuel committee will hold a meeting to outline its work which is to be done in co-operation with the Automobile Chamber of Commerce. On the following day the wheel standardization committee will meet in New York to take up the work that was begun at Cleveland this month.

NEW YORK CITY, March 21—The Stoddard Motor Co., of this city, which formerly handled Stoddard-Dayton products for the old U. S. Motor Co., has been declared a voluntary bankrupt. The liabilities, aggregating $253,338, are all due to the Maxwell Motor Co., Inc., and the assets are $66,988. The Maxwell company has decided to take the distribution of its products in its own hands.

PARIS, FRANCE, March 19—The Grand Palais, where the salon of motor cars is held annually, is said to be in a very shaky condition. The various floors creak and the weakness of the construction became more pronounced by the flood several years ago. Since then $160,000 was estimated by a commission to be needed to put the building in shape, but nothing has been done.

English Motor Experts Organize

NEW YORK CITY, March 25—According to a London, Eng., dispatch, there has been organized in that city, the London Chamber of Motor Experts, an organization of automobile specialists formed for the purpose of inspecting and passing on many inventions intended for the automobile field. It is the purpose of the organization to charge a nominal fee for the examination of patents and the conducting of tests with various apparatus, etc.

LONDON, March 14—In July, under the presidency of Prince Arthur of Connaught, an Imperial motor transport conference

Detroit To Pay Higher Freight for Better Service

will take place in this city. All the recognized bodies connected with the manufacture and use of motor vehicles as well as other engineering experts connected with the Dominions and Colonies are represented on the executive committee. Not only will the conference devote its attention to the business of touring motor cars, but also to the whole problem of the transport of motor vehicles whether for pleasure or industrial purposes. As far as arrangements have gone, it is anticipated that Prince Arthur of Connaught will receive the delegates on Friday, July 18, and that on the following day, the Industrial Motor Vehicle Exhibition which will be opened at Olympia will be visited. On the following Monday and Wednesday further meetings of the conference will take place and the final meeting will be held on Saturday, July 26.

Canada Get 468 Cars in January

WASHINGTON, D. C., March 24—During January, 1913, of the 2,157 automobiles which were exported to foreign countries from the United States, Canada got 468, the total value of which was $593,700. British Oceania came next witht 403 machines imported of a total value of $386,833, and the United Kingdom next with a total of 374 to the value of $258,463. Then came South America, importing 351 machines of a total value of $393,079, Asia and other Oceania, 193 of a total value of $182,600 and the rest following in this order:

France, West Indies and Bermuda, Europe, other than the countries listed; Mexico, Germany, Italy. All other countries took a total of ninety-three machines of a value of $103,118.

During January the United States imported seventy-one machines of a total value of $174,689, as against January, 1912, when it imported eighty-four machines of a total value of $199,197. Of the machines imported, twenty-four came from France, twenty-one from Germany, ten from Italy, eight from the United Kingdom and eight from all other countries.

Wants Cole Stock Returned to Him

INDIANAPOLIS, IND., March 24—Lee Watson, of Texas, has brought suit in the local courts against J. J. Cole, S. J. Kuqua and J. Frank Morrison asking that a transfer of 165 shares of stock in the Cole Motor Car Co. made to them in September, 1910, be set aside. He also asks that he be allowed back dividends and that the court fix the price he shall pay for the stock he sold.

In his complaint, Watson alleges he sold the stock for $17,500 as the result of misrepresentations of conditions.

Columbus Buggy Still Tied Up

COLUMBUS, O., March 24—A proposition made by F. R. Huntington, a banker of this city, to pay 35 cents on the dollar for the claims against the Columbus Buggy Co., now in the hands of the receiver, has been refused.

Another plan to pay the creditors 66.6 cents on the dollar is being worked out by the creditors' committee and will probably be announced within a short time. In the meantime the large plant of the concern on Dublin avenue is practically idle.

YORK, PA., March 22—All records for attendance were broken during the first week of Harrisburg's fourth annual automobile show last week. The exhibition is the most complete ever held by the Harrisburg Automobile Dealers' Association and exhibitors report having done much business during the first week of the show.

City's Shipping Facilities Inadequate—Railroad Men To Confer with Detroit Manufacturers

Canada Ranks First in Importing American-Made Cars During January—Columbus Buggy Plan Fails

DETROIT, MICH., March 22—Freight traffic managers and other railroad officials who are in convention in this city this week made it clear to Detroit manufacturers and other shippers that in order to accede to the demands for increased railway terminal facilities and quicker and better service in the transportation of package freight and carload lots the only possible means was by the increasing of the existing freight rates. The present charges are so low in view of the large increase in cost of transportation that Detroit cannot expect any better service until they are put on a proportionate basis. Before long a proposal will be made to Detroit manufacturers by those railroads which have been investigating the conditions here.

Paul Wadsworth, general traffic manager of the Delaware & Hudson, in his talk before those gathered at a banquet tendered the visiting railroad officials by the Board of Commerce admitted the inadequacy of the city's shipping facilities, and showed that while the railroads are able to cope with the situation of certain periods of the year, they are unable to meet the vastly greater requirements of other seasons. This is largely due to the plan of the many automobile factories of bringing out new models for spring delivery and being less active during the early fall and winter months. Terminals to handle the enormous business of these busy seasons would mean a large investment, and at the same time they would not be used at the slack times.

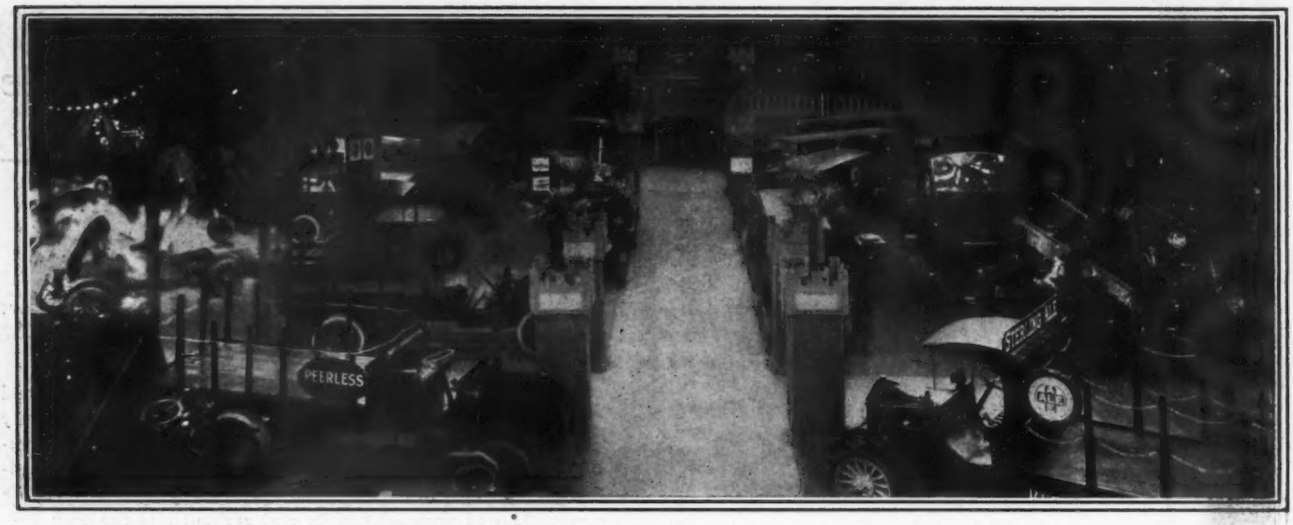
Co-Operation with Railroads Urged

Railroads are operating at a very close margin of profit, according to the Delaware & Hudson official. During the last 5 years, money has not been very easy to obtain for improvements of equipment and in further touching upon the financial side of the railroads' problem stated that most loans had to be on short time paper, that of long terms meaning a high rate of interest and a permanent tax upon the property. Many of the roads have reduced their dividends and thus damaged their credit in the borrowing market. Detroit shippers were urged to cooperate in every way possible with the roads, who are no less interested in efficient and quick service than are the former.

Another speaker showed that the roads are further harassed by their employees on all sides demanding higher pay.

Last summer, automobile manufacturers were compelled to store their finished cars in tents and other temporary quarters owing to the freight car famine. Detroiters contend that the least the railroads can do is to take as good care of this city's shippers as they do of those in other cities. The lack of foresight in the rapid growth of Detroit in the past few years was given as the chief reason for the present inadequacies of shipping.

The contemplated increases mean only one thing—that the car buyer will have to pay the piper. Automobile makers do not pay the freight on the cars which are sold by their agents and therein lies the time-worn reversion to the pocket of the ultimate consumer. Increased freight rates will also mean an increased cost to the buyer of parts in other cities—this will favor Detroit in that it will cause makers in other localities who depend upon Detroit-made parts to think of getting closer to their supplies.



General view in Grand Hall, showing the uniform stand decoration, which was also a feature of the passenger vehicle show

Six New Types at Boston Truck Show

BOSTON, MASS., March 24—The annual exhibition of commercial motor vehicles which opened in this city a week ago and closed here tonight has proved to be one of the best yet held by the Boston dealers because of the amount of retail sales made and the general interest engendered in motor trucks by the exhibition. The attendance was not large but the amount of business done was large in proportion to the numbers attending. The entire New England territory was well represented and many of the sales made were to outside Boston purchasers.

With a total of fifty-four exhibitors, the show numerically takes third place in comparison to the Chicago and New York truck shows as Chicago had seventy-six exhibitors and New York sixty-six. The Boston list of exhibitors included practically all of the big concerns with the exception of two or three which were left out because of lack of room to suit them or for other reasons. The list shows forty-eight makers of gasoline machines, six electric machine representatives and one maker of steam cars, this being the first truck show at which the Stanley steam trucks have been displayed.

The Boston show had its quota of new trucks not seen at either New York or Chicago, this list including the front-wheel drive Eldridge electrics made in various load capacities; the new Edison electric made in Lawrence, Mass.; the Sowers gasoline truck built in Boston, and the Victor built in Buffalo. The Eldridge vehicles all use the Couple-Gear wheels which incorporate an electric motor in each. These wheels are mounted in front and permit of the use of large diameter artillery wood wheels with metal tires in the rear. The rear wheels vary in size, depending on the load carried but approach 72 inches in diameter and carry steel tires 4 inches wide and 1 inch thick.

Unconventional delivery wagon of General Vehicle Co.

Little can be said of the trucks exhibited so far as chassis details are concerned. Each show, however, has its own peculiar styles of bodies and so important are these becoming that the more interesting types will be reviewed herewith. One novel body was that of a large Tarvia spreader on a 6.5-ton Alco chassis. The body is a tank wagon style and has provision for heating the tarvia inside the tank from a steam road roller.

A type of body local to Boston is that of the furniture-moving companies which is not of the inclosed van type but of the open express style. These bodies approximate 13.5 feet in length, are 5 feet wide and the sides are 2 feet high.

Among the concerns exhibiting bodies of this type were Packard, Kelly, Knox, Atterbury, Lauth-Juergens and others.

The Packard company exhibited an interesting ice-cream body for a Boston house. The body is made with a front compartment and a rear compartment separated by an aisle extending crosswise between them. The front compartment measures 4 feet, 2 inches long, and 4 feet, 4 inches wide; the rear compartment is 3 feet, 6 inches long and 4 feet, 4 inches wide; between the two is the aisle, 25 inches wide, reached by a step.

The Peerless exhibit contained a sight-seeing car with capacity for forty people. It has been built for use in Porto Rico, where it will operate on schedule over a route 120 miles across the island, making the trip in one direction each day. It resembles open trolley-car construction rather than the conventional sight-seeing style. There are five cross-seats, which should accommodate six persons each. At the rear are two short longitudinal seats with baggage space between them. Entrance is by means of two steps at each side, these extending the entire length of the seating portion of the vehicle. These steps fold in when the vehicle is traveling. The total weight is 8,500 pounds, and the speed 12 miles per hour. The body is built on a 3-ton chassis which has a motor with four cylinders each 4.5 by 6.5 inches bore and stroke. There are four of these vehicles at present operating in Porto Rico and two more are being shipped.

The various exhibit spaces showed bodies intended for a variety of uses. Naturally dumping types for coal and building construction trades were in great numbers. They were shown by White, Packard, Peerless, Pierce, Locomobile, Velie and some others. Peerless shows two types, one in which a rack-and-pinion method of dumping is used and the other in which the front end of the body is elevated by means of two vertical chains passing over upper and lower sprockets. There are many examples of special bodies for such concerns as bakers, furriers, confectionery houses and other concerns using vehicles of 1,500 pounds capacity and over. The White company showed one body for a confectionery house in which a metal interior is used. Provisions are included for a series of adjustable shelves, there being three of these, extending from end to end of the body, thereby increasing its useful floorspace four-fold. Other concerns exhibited bodies showing a variety of good decorative designs. One of these was an Autocar sold to a Boston furrier. Practically three-quarters of each side is given over to a drawing of a polar bear, very suggestive of the trade in which the vehicle operates.

Of the new vehicles, the largest exhibit was that of the Eldridge Mfg. Co., Boston Mass., building front-wheel-drive electrics, and electric tractors with three and four wheels. One of the vehicles exhibited was a 5-ton Watson stone wagon in which the floor is hinged at each side and opens downward to unload. This wagon is fitted to take removable batteries so that two batteries can be used in the same day. The vehicle has a speed of 6 miles per hour. The rear wheels are 56 inches in diameter and are shod with 4-inch steel tires. On the 5-ton coal wagon the rear tires are 68 by 4-inch steel bands 1.25 inches thick. Another vehicle is the cart especially designed for alley use in Boston. It is a three-wheeled vehicle with a driving wheel in front, and a metal dumping body mounted between the two large steel-tired rear wheels. The vehicle has a 2-ton capacity and is especially intended for maneuvering in cramped quarters where it is impossible to use a standard vehicle. It has a mileage radius of 25 per charge of battery and is set to operate at 6 miles to the hour.

The Eldridge tractor was shown connected to a trailer for the lumber trade. It is a four-wheel design carrying its own battery and has a fifth wheel for supporting the forward end of the trailer. Its load is 5 to 7 tons and its speed is 8 miles per hour.

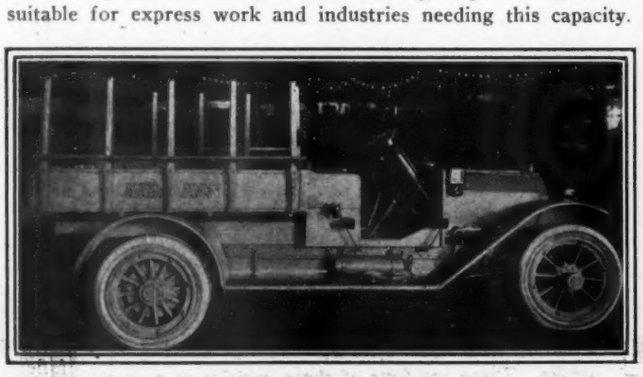
The Edison electric truck is built by the Edison Electric Vehicle Co. of America, Lawrence, Mass., and is made in 1,000 2,000 and 3,000 pound sizes. All of these are built with side chain or shaft and worm-gear drive. They carry Edison batteries and use General Electric or Westinghouse motors. The 1,000-pound vehicle has a speed of 12 miles per hour, and a mileage radius of 55. It uses 34 by 2.5-inch solid rubber tires all around. The load-carrying space measures 3 feet 6 inches wide and is 6 feet long. This delivery vehicle is designed for such trades as grocers, butchers, bakers, laundries and department stores. The 2,000-pound wagon has a mileage of 60 per battery charge, and a speed of 4 to 12 miles per hour. It has four forward speeds and three reverse. The 3,000-pound vehicle is suitable for express work and industries needing this capacity.

Dumping gear of coal wagon on Velie chassis

It has a speed of 10 to 12 miles per hour, and a battery range of 50 miles. The chassis measures overall 154 inches and the loading space is 44 by 105 inches. Axles are either Timken or Standard. The David Brown worm and wheel are used when shaft drive is fitted.

The 3,000-pound Sowers truck is manufactured by the Sowers Motor Truck, of Boston. It is a conventional motor-under-the-seat type with three-speed gearset, combined jackshaft and differential and side-chain drive. The vehicle has a loading space 10 feet 6 inches long and 5 feet wide. The wheelbase measures 110 inches and its maximum speed is 16 miles per hour. The front and rear tires are 36 by 3.5 and 40 by 4. The motor is a four-cylinder Wisconsin type with 3.75-inch bore and 5-inch stroke. The cylinders are cast in block and have inclosed valve parts Other motor features are Bosch magneto, Schebler carbureter the thermo-syphon cooling. The gearset is selective. Steering wheel and control levers are on the right side. The company expects to market soon a 2-ton vehicle with the motor under the hood, with the steering wheel on the left side, with levers in the center, and a wheelbase of 136 inches.

A truck not seen at New York or Chicago shows, but one which was placed on the market last fall and which was exhibited is the Marmon. This is a 1,500-2,000-pound delivery wagon set to operate at 20 miles per hour. It is largely fashioned after the four-cylinder Marmon passenger car chassis and has the motor under a forward hood and uses shaft drive. The rear tires are double pneumatics. The wagon is fitted with a self-starter and has right side steeling and control.



Marmon truck has double pneumatics on rear wheels

Boston built Sowers truck of 1.5 ton capacity

Digest of the Leading Foreign Journals

French Press, No Longer Indifferent to American Design, Dissects a Small Mechanical Detail—The Fag End of Mechanical Efficiency—Experimental Iron-Tired Wheels—Mission of the Worm Drive—Memorandum of Recent Technical Treatises

CRITICISM of American Drive-Shaft Construction.—Disquieted by the ability of American manufacturers to sell automobiles which please the public at a lower price than European makers are compelled to ask, members of the technical press in the three principal industrial countries of the old world are at pains to point out flaws in those details of design where a cost reduction has been effected through a simplification of the current European practice. As this new attitude represents a great improvement upon the position previously taken, which consisted in a general denouncement of American workmanship and a sneer at mass-production methods—as if these methods were incapable of development in the direction of accuracy in the results—an example may be quoted of the more definite criticism now coming into vogue. The subject is a drive-shaft construction which was shown in an American car exhibited at the last Paris salon and which is not without a parallel in other American cars.

The construction is shown diagrammatically in Fig. 1, and its details are referred to as follows:

"The transmission has a single universal and the rear axle is oscillating. The drive-shaft is inclosed in a tube constituting both torsion rod and driving-strut. But this tube does not terminate either in a hinged fork stay or in a ball-and-socket joint—pieces which are expensive to produce. To its end there is secured a lever AD which is fixed at D and cannot turn around this point, with the result that the angle ADQ is invariable. This lever is journaled at A to a rod AB which at its front end is journaled to the side of the gearbox and transmits both push and reaction. It is placed at an angle which makes its prolongation pass through O, the point of contact of the vehicle wheel with the ground. In the mind of the designer, what should take place is this: The reaction due to the application of motor power gives rise to a force y which is applied at the point D, at the spot where the drive-shaft revolves in a ball-bearing mounted in the tube, and acts in a vertical upward direction. On the other hand, the driving-push, transmitted from the driving-wheels through the tube, may be represented as a horizontal force Z_1 and applied at A, and it can be resolved into the two forces m and t_1. If the dimensions of the parts AD and AB are suitably chosen, y and t_1 can be made equal and opposite, so that one offsets the other, and there remains then only the force m which works in the direction of the rod AB exerting a simple compression stress upon it. An expensive piece of machinery, a fork or socket joint, has thus been replaced by a simple rod of negligible cost and by a lever which is riveted to the tube and also inexpensive. The solution is seductive.

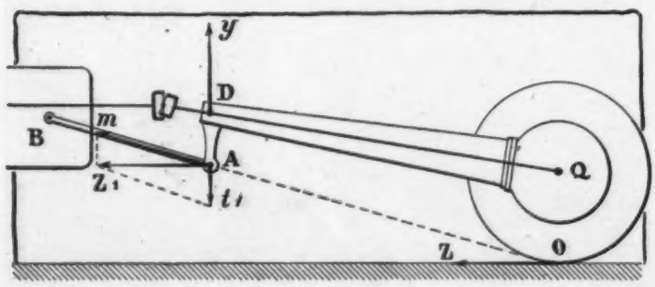


Fig. 1—Diagram of construction denounced by French critic

"If the force of the driving-push is changed through operation of the motor or the gears, the reactions vary in the same manner, and it may be expected that the forces m and t_1 will always offset one another. And, if the brakes are applied, the reaction y changes direction, acting now vertically downward, but at the same time the driving-push is changed into traction so that its direction is similarly reversed, and one may still hope that the two forces will be mutually compensated."

Having thus represented the presumable reasoning of the designer, the critic proceeds to show by a mathematical development of the subject that m and t_1 cannot balance against one another unless the rod AB is infinitely short in comparison with DQ, and this would be the construction corresponding to a fork or socket joint; also that the resultant of these two reactions is an upward thrust which has to be absorbed in the universal and the rear bearing of the gearbox to the detriment of these parts, and that this thrust is greater, other things equal, the more the direction of the drive-shaft departs from the horizontal.

As might be expected, the critic is able to show that a still much greater discrepancy between the two reactions arises when the brakes are applied. Comparing with recent French construction [as in Peugeot racing and other cars] which also tends toward simplification, he suggests that the American construction which divides the stresses between the rod AB and the universal is certainly inferior to the method consisting in absorbing the driving-push in the vehicle springs and the motor torque partly in the torsion tube and partly in the universal. By the latter method the movements of the rear axle are at least not hindered, as the critic believes he has shown mathematically that they are in the American construction, and do not create unnecessary additional stresses upon the universal or the bearings and other organs.

The critic shows further that all one-sided movements of the rear axle and wheels tend to deform the drive-shaft, the rod AB or the lever AD, and that either these parts—particularly the rod AB and the shaft—will be deformed or else the one-sided movements will be effectually resisted, the running qualities and the durability of the vehicles being impaired in either case. The construction is therefore to be completely rejected, he concludes. —From *Technique Automobile et Aérienne*, February 15.

[The careful reader will not fail to notice that it is essentially a man of straw whom the critic has transfixed with his lance, partly because a construction exactly like the one described by him is not common among American automobiles and partly because its merits and demerits depend largely upon other features in the construction of the vehicle—the degree of flexibility of the frame and its cross-members, for example; also

upon the nature of the spring suspension and the relative dimensions of the drive shaft, the rod AB, the torsion tube and the universal. The work of an automobile is such that without some compromise relating to the possible relative movements of its parts—based on an indeterminate flexibility here and there—there would not be any automobiles built today that the general public could afford to buy. If an objection can be taken to a compromise construction mainly dictated by a desire for reducing the cost of manufacture and the selling price, a stronger objection might with equal right be raised against the general tendency among French manufacturers to save a little expense for fuel by equipping cars with very small high-speed motors with high compression, whose average work in average service must be a good deal harder for the material put into them than similar work is for the larger motors used in the small American cars. In both cases there is a question of saving involved, and it seems to be a question of general judgment and experience whether in either case the saving is actually effected or is bought too dearly.—ED.]

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TWO Aspects of Efficiency.—Usually the efficiency percentage of a motor or of a mechanical movement is looked upon and estimated from the wrong end. If one mechanism is found by test to have an efficiency of 96 per cent., and another has 92 per cent., there is a tendency to consider the difference as unimportant. The latter is only one-twenty-fourth less efficient than the former, it is said. If the relations are as 80 and 90, the difference is considered greater than in the first case. Yet it is only with reference to the power requirements that this view holds good. When wear and durability are concerned, efficiency should be measured backward from the 100 per cent. An efficiency of 96 means 4 per cent. of waste, while one of 92 means 8 per cent. of waste in one form or another. The waste means generation of friction and usually a corresponding amount of wear and deterioration. To begin with, the first mechanism is then in operative perfectionment twice as efficient as the other, and, as wear advances in a geometric progression, as a rule, the difference in the degrees of efficiency of the two mechanisms under comparison will soon be still much greater under the same amount of work; that is, one will prove much less durable than the other. A case in point is the enormously enhanced serviceability that is obtained from ball-bearings by the minutest attention to accuracy and finish, although the nominal initial efficiency may be raised only 1 per cent. by the extra work and care.

On the same principle, an 80-per cent. efficiency is twice as good as a 70-per cent. efficiency, so far as any consideration of practical importance is concerned, excepting that relating to the required power, and in the case of a mechanical device, where thermal efficiency in the utilization of expanding gases is not in question and where the majority of the wasted power finds expression in wear, one of 70 per cent. efficiency will usually be found to be worth much less than one-half, from the standpoint of the investor who wants value for his money, than another mechanism serving the same purpose and reaching an efficiency of 80 per cent. Hydraulic transmissions may constitute an exception, in so far as some waste heat in them may be disposed of by radiation without causing wear of the working parts.

This important and neglected viewpoint has recently been justly emphasized in connection with tests of worm gears for automobiles made at the Lanchester works in England.

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STATUS of the Worm-Gear Drive—Some variations in the current reports concerning the properties and peculiarities of worm-gear drives for automobiles are accounted for by F. Carlès in a review of automobile mechanics. With regard to silent operation, he says, the worm gives complete satisfaction. In a properly established worm-drive, silence is obtained at once and continues so long as the gear lasts. Wear of the parts does not affect it, and this is perfectly natural, since there is no interruption in the contact between driving and driven members; scarcely even at a reversal of the direction. There are cars in England which have run 60,000 miles and are as silent as at the start. But while the silence is not affected by the wear, the efficiency is.

On this subject of the efficiency of the worm drive a great deal has been printed during the past 2 or 3 years. From some tests made by the Oerlikon company of Switzerland it seemed reasonable to infer that the efficiency of the worm-drive was at least equal to that of the bevel-gear drive, and this inference was presented to the world, somewhat hastily. The tests gave an efficiency of 97.5 per cent. for a worm with five threads acting on a bronze wheel with 68 teeth. The motor used was operated at 780 revolutions per minute. In a Glaenzer worm-drive acting upon a wheel with roller teeth the average efficiency was found to be 93 per cent. With some optimism, it was then possible to suppose that the worm was slightly superior to the bevel-gear, which under the most favorable conditions gives an efficiency from 90 to 95 per cent. On the other hand, a table compiled from data furnished by manufacturers shows that the efficiency of the worm-drive in automobile practice is lower than that of the bevel gear except at high motor speeds, such as from 1200 to 1800 revolutions per minute. At the low speeds it even drops to an average of 70 per cent. This difference between a maximum of more than 97 per cent. at some tests to 70 per cent. under certain practical conditions may be reconciled by assuming that the efficiency is first of all a function of the gear-reduction in the drive, and this reduction can never be the most favorable in automobiles on account of the need of having the gear reversible, for which purpose the thread of the worm must have a pitch of about 45 degrees. This cannot be be varied materially, and it seems to be the upshot of the data that with this pitch the efficiency drops rapidly when the speed of the worm shaft is reduced.

The worm drive has however important advantages relating to lubrication and wear. Owing to the relatively large surfaces which are in contact, the driving pressure per square millimeter is much smaller than in a bevel-gear drive. Consequently the oil is not so readily driven out from between the working surfaces, and the wear is reduced to much less than it would be supposed to be from the amount of sliding friction involved in the action. The latter factor, on the other hand, makes the need of providing an unfailing lubrication imperative. The rate of wear is, on the whole, considerably slower than that of a bevel-gear, if the worm-drive is well made and carefully lubricated. The consumption of oil for this purpose is large.

The security against breakage of teeth is much greater than in a bevel-gear drive by reason of the reduced driving-pressures per unit of area, as referred to.

The data, in so far as they have been established, point thus to the worm drive as desirable for a high powered, luxurious and fast limousine, with which a reduced efficiency, meaning the loss of a few horsepowers, incurred when the vehicle is driven slowly, is a matter of no consequence. But for its application to slow-moving trucks and low-powered small cars the demonstration in favor of the worm-drive is still to be made.—From *La Vie Automobile*, Feb. 22 and March 1.

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IRON-TIRED Truck Wheels.—While it is the universal experience that the apparently high cost of a solid-rubber tire equipment leads to a lower all-around upkeep cost than that obtainable with steel or iron tires in the case of motor trucks which travel normally at from 8 to 15 miles per hour over hard roads, it is widely believed that the situation may be different in the case of heavy motor vehicles which need not be driven faster than 8 miles per hour at any time, either loaded or empty, and whose work lies mainly over soft roads, or even over macadamized roads. In the United States considerable motor truck work of this nature may be contemplated in connection with mining

enterprises, interurban freighting and for the transportation of garden and farm produce, in which lines any saving in tire upkeep and a simplification of the tire equipment would also be especially appreciated and would tend to open up a market for motor trucks which has barely been touched.

Captain Renaud, whose data upon truck wheels and tires in general were presented in part in these columns last week, also refers to some of the experiences and experiments made with iron-tired wheels in France, where however the prevalence of stone pavements in towns and villages accentuates the drawbacks of iron tires, while little transportation work is offered that must not be done at all seasons of the year if at all; so that also at this point a difficulty is experienced with iron tires in the poor traction and steering qualities on snow or ice which have so far been characteristic of them.

As iron or steel tires in all vehicles, except steam tractors and slow-moving agricultural implements and machinery, can be used with wood wheels only, if ruinous vibrations shall be avoided, one of the foremost problems in connection with them is to obviate the loosening of the wooden construction and the onerous re-tightening which such loosening necessitates. In the French artillery steel tires were tried because a thin steel tire, sufficiently hard to be elastic, holds the wood wheel together more strongly and more lastingly than a heavier iron tire, but it was found that the hard steel tire gives considerably poorer traction than a soft iron tire, especially on stony roads or pavements; and for driving wheels of a truck or other vehicle this disadvantage is of importance. In the end, the steel tire also succumbs to the same trouble which overtakes the iron tire in much shorter time. The hammering which the metal tire receives on the road—especially of course on rough stone pavements—lengthens it and thereby loosens it from the wood rim, and then it is that the wheel must be retightened, from the hub outwardly, in order to fill the enlarged tire. With heavy loads, hard roads and high speed this necessity arises very soon.

Mr. Renaud suggests that it should be possible to effect an improvement, in the way of combining the better traction of soft iron tires with the greater durability of hard steel tires, by providing a tire which is hardened next to the wood rim while the outer surface portion is kept soft, as might be done by spraying the inner surface of the tire with water when it is red-hot, [similar processes being in use in the manufacture of vehicle springs]; but no such method has yet been perfected.

Some iron-tired wheels have been developed in the French automobile industry which are designed especially to minimize the troubles arising from the stretching of the tires. A wheel used for the lighter models of Purrey steam trucks and also for the rear wheels of some Berliet gasoline trucks is shown in Fig. 2 and the machine used for tightening this style of wheel is represented in Fig. 3. The special feature is that the rim is made of as many pieces as there are spokes and that hardwood wedges C are employed at both ends of the spokes for tightening purposes, as shown in the drawing. The metallic hub is slightly conical. As soon as any looseness is noticed in the wooden structure, two semi-sleeves, N in Fig. 3, of suitable thickness are pressed in between the hub and the wooden wedges, and, if necessary, metal wedges may also be inserted at other points.

On the very heavy models or Purrey steam trucks which carry loads from 15 to 20 tons, the type shown in Fig. 4 is used. Here full sectors of wood are compressed very strongly within an assembling ring 30 millimeters thick, and upon the latter there is shrunk a tire 60 millimeters thick. The spoke sectors are aligned by radial tenon-pieces inserted in mortised spaces in the meeting-edges of the sectors. The hub is put in place by strong hydraulic pressure, and one such wheel weighs 700 kilograms. It remains tight for a long time, but it is necessary to renew the outer tire when it has been worn down to one-half of its original thickness. The same principle has been applied by Berliet in the type of wheel shown in Fig. 5, but the shape of the spokes has been made more sightly and the construction of the central portion has been modified so as to make the re-tightening method illustrated in Fig. 3 applicable. This demountable wheel thus consists only of spokes, wedge pieces abutting against the hub and the double iron tire, the wood rim being eliminated.—From *Le Génie Civil*, March 1.

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Compression Cocks and Burnt Fingers.—The pet cocks in most motors is so bored that the handle lies horizontal when the cock is closed. When opening it while the motor is running one is liable to get the fingers burned from the flame which shoots out. By boring it so that the handle hangs downward when the cock is closed this is not so likely to happen; neither will the cock turn open of its own accord.—From *Automobil-Welt*, January 31.

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Memorandum of Articles Unadapted for Abbreviation

Among compendious treatises on highly specialized subjects which have recently appeared in continental publications, and copies of which, in the original language in each case, may be procured for those interested, are the following:

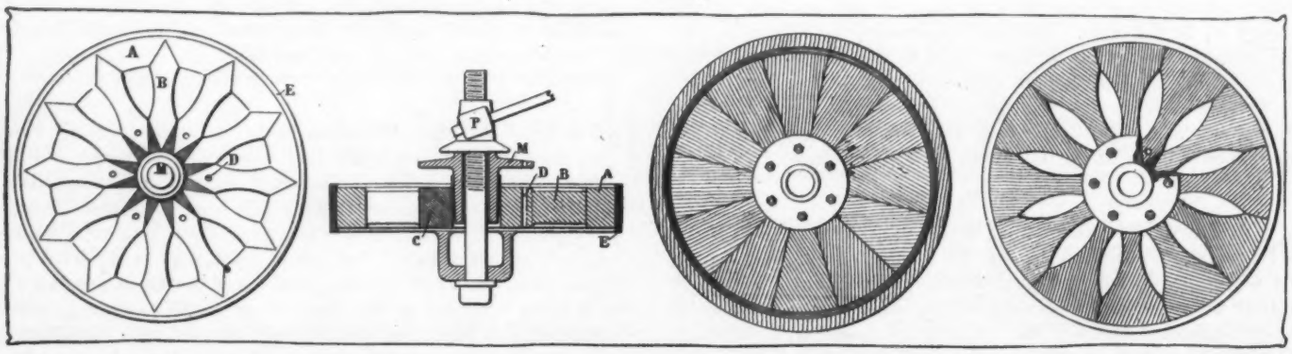
The Calculation of Springs—giving simplified methods for calculating coil springs, partly after Siebeck. Serial begun September, 1912, closed February, 1913. In *Fer et Acier*.

The Shaping of Involute Spur and Bevel Gear Teeth.—7 pages, graphic and mathematical.—By P. Gerlach in *Werkstattstechnik*, February 1.

The Sunderland Gear-Cutting Machine (straight spur and helicoid gears).—Brief illustrated description.—By H. Féron in *Le Progrès Industriel*, Feb. 15.

The Operating Mechanism for Non-poppet Valves.—Description of movements employed and principles involved.—By Praetorius in *Der Motorwagen*, Feb. 28.

Compressors for Gas Turbines.—Illustrated descriptions of different methods; to be continued.—by Wilhelm Gentsch in *Die Turbine*, March 5.



Figs. 2, 4 and 5—Iron-tired wood wheels used for heavy motor trucks in France. Fig. 3—Screwpress used for retightening the types shown in Figs. 2 and 5

Time for Cleaning the Car

Old Oil and Mud Should Be Removed and the Surface of Body and Trimmings Given a New Finish

Accessories Such As Top, Lamps and Upholstery Need Special Attention in the Spring

THE time is fast approaching, indeed, is already here, when the car owner must consider the matter of putting the car in condition for the spring and summer campaign on the road. Nothing attracts more attention or excites more favorable comment than the neatly varnished car with lamps, fenders and other accessories shining fine and clean under a new garb of material, the top and upholstery cleaned and renovated and everything, in fact, conditoned to a nice point of harmony throughout.

A very large number of cars this spring will, upon examination, be found in a sufficiently good condition to need only a good rubbing down and a simple coat of varnish applied.

This work carries with it, naturally, some attention to lamps, fenders, top and other furnishings in order to get the car out in a well-balanced condition.

Cleaning Old Oils From the Car

It is usually quite a job to start the grease and smeary accumulations and get them thoroughly cleaned off the car, and particularly off the chassis or running parts. A combination of crude oil and turpentine—one part of oil and two parts of turpentinue being recommended—swabbed on quite generously and left to attach and soften up the grease is more certain and effective than other mediums for the preliminary process. Use a case knife or two, a couple of small hook scrapers and a common putty knife for scraping and cleaning parts which the oil and turpentine mixture fails to loosen. Finish off by saturating the greasy parts of the surface with a dressing of clear turpentine and then with strips of clean burlap scrub dry and clean It is important that the grease and oil be cleaned off thoroughly. This is not always attended to as it ought to be, which accounts for the great number of shabby, unkempt appearing cars yet in the prime of their usefulness.

The body surface of the car should now be rubbed with pumice stone flour and water sufficiently to lay down any surface roughness and to develop a clean, receptive surface. Any defects, or bruises, or chipped places need to be touched with color made to match as closely as possible the color of the car. Owing to the fact that, as a rule, it is almost impossible to match the old color which is usually more or less faded and not uniformly faded, this touch up color should be applied very carefully and sparingly with none of the color allowed to run over the edge of the blemish. In mixing the color always use enough rubbing varnish to cause the color, when applied to the surface, to dry with a gloss. In this state it is then prepared to retain in the drying process its original shade, as shown in the container after mixing. A color with a pronounced gloss reflects more light than it absorbs and therefore when exposed to the light upon the surface remains a "fast color."

It is a good plant to give the chassis, also, a light rub over with the pumice stone flour and water. Apply this and do the rubbing with a small fleece wool sponge, which is less likely to cut through the sharp edges of spokes, springs, etc. Give these parts the necessary touching up, practicing the same care in this work on the chassis as upon the body surface.

For the body of the car use a finishing varnish that dries, in proper surroundings, out of the way of dust in 6 hours and is fit to use in active service in three days. Such varnish should be bought for its capacity to resist the action of mud, water, grease, etc.

For the chassis a varnish is recommended that will resist to the utmost the destructive action of soap, mud, water, grease and oils. Such a varnish should dry free from dust in 3 hours and harden ready for use in 2 days.

In connection with these touch up and varnish jobs it not infrequently happens that after the body surface has been given the pumice stone flour and water rub surface checks appear to a depth and in such variety as to call for two coats of varnish instead of one, in which case the first coat should be a rubbing varnish made to dry in from 20 to 24 hours. This extra coat of varnish serves to penetrate the cracks and seals them. Give this coat a nice, uniform rubbing with pumice stone flour and water, clean up carefully and apply the finishing coat. Even the car with the body surface considerably slashed with checks, both fine and large, can be made with the two substantial coats of varnish to look almost like new.

In the case of a car showing the color faded and bleached out—its original shade and lustre quite gone, in fact, it is practically labor and material thrown away to try to touch up a surface of this kind. The better way—the only way, in a word—is to clean the surface of grease and foreign substances and then sandpaper down smooth and clean with No. 1 sandpaper, after which dust off clean and apply a solid coat of color. To get satisfactory results with one coat of color it will be necessary to use the same shade of color that was used in previously painting the car. In preparing this color, which should be a japan ground one, thin down with pure turpentine and to every six parts of color add one part raw linseed oil, this latter forming the binder to fasten the color to the surface. This color will dry over night, whereupon it may be striped in the morning and late in the afternoon given the rubbing coat of varnish.

Special attention should be given the guards, fenders and under parts. It often happens that these parts are in much worse condition than other parts of the car and when such is the case they require an extra coat of some hard drying varnish that dries out of the way of the dust in 2 hours and hardens over night.

In doing over the lamps in color it is the best practice if a baking oven can be secured to bake the pigment on. A color varnish baked on the lamps at 170 degrees for 6 hours will give an unsurpassed finish for such parts.

The Top Often Deserves Attention

The car top and the upholstery deserve attention. If rubber or leather, sponge off with tepid water. What the requirements are can then be judged. A good hand buffed leather top will hardly, if at all, need any further treating until the enamel of the leather wears thin. The rubber top after a season's wear, if not before, will need a thin application of some good reliable dressing, and the same treatment may be given the leather top when the enamel begins to look shabby. Although mohair top dressings are advertised and are doubtless good preparations, we should hesitate to use anything on mohair until the fabric begins to look the worse for wear. A good, thorough brushing with the whisk broom will do wonders for the mohair fabric, which has not the clean appearance it once possessed.

For the upholstery, if of cloth, the vacuum cleaner is a splendid device. Even in the case of leather it will take every atom of dirt or other accumulations from around buttons, binding, etc. Door jambs and interior parts of the car which are painted and varnished had best be given a dull finish or a polished finish. If finished in high gloss the parts show finger marks and hand blemishes readily. Just fetch these parts up in varnish and if they are to be polished use polishing varnish for the last coat. Rub the varnish in due time with pumice stone flour and water and then with some reliable polish rub until the generated friction brings out the high, sharp brilliancy that is proof against finger marks, etc.

Gear Changing and the Clutch Brake

Silent Changing Rendered Easier By Clutch Brake Which Permits Control of Gear Before Meshing

By E. P. Batzell

¶ *Good results in gear changing can only be secured when the pitch velocities of the meshing gears are practically alike. It is desirable that a partial connection between the motor and clutch be maintained during the operation of changing gear, but the clutch should always be released momentarily on actual contact of gears so that any existing difference in pitch speed between the two members will not transmit a shock to or against the mass of the clutch.*

¶ *If properly fitted and provided with a means of adjustment a clutch brake is of advantage in gear changing.*

¶ *When starting, the clutch should be entirely disengaged, so that the full braking action of the clutch-brake is applied, thereby bringing it to rest. When changing to a higher gear, the clutch should be only partially released so that the brake only slows down the driving member of gearset. When changing to a lower gear, the pedal should be operated so that the clutch-brake is not brought into action at all. The clutch member can then increase its speed with the engine, during the free period of changing.*

THE noiseless shifting of change-speed gears requires that the driving and driven gears, which are about to be meshed, rotate with equal pitch velocity. Unless this is so there will be some shock between the gear teeth when they come in contact. It is clear that the required change of pitch velocity when going from one gear combination to another should be in the rate of the respective ratios of these two combinations. Being extremely difficult to control the speed of the secondary or driven element of the gearbox, because it is rigidly interconnected with the driving wheels of the vehicle where the only available speed control medium is the brakes, it is common in driving practice to use the motor and the clutch for regulating the relative pitch velocity of the gears to be meshed. This regulation is exercised on the primary or driving part of the gearbox.

Motor Is the Chief Factor

The motor is the chief factor for proper gear meshing when it is necessary to change from a higher to a lower gear without stopping the vehicle. Most frequently the motor performs the desired function automatically. In this case of speed changing the secondary gear to be meshed has a higher pitch velocity with the initial gear ratio in use, than its respective primary gear has. Consequently the latter has to be speeded up in the rate of the new ratio to the initial one, if clashing is to be avoided, because the pitch velocity of the secondary gear would vary only with the vehicle speed. Necessity for use of a lower ratio without stopping, generally would appear after the motor becomes overloaded using the initial higher ratio. By easing off the clutch without materially decreasing the throttle opening when going from high to neutral, the motor gets a few moments for speeding up and carrying away with it also the clutch and the primary gear parts of the gearset, before the driver has time to pass

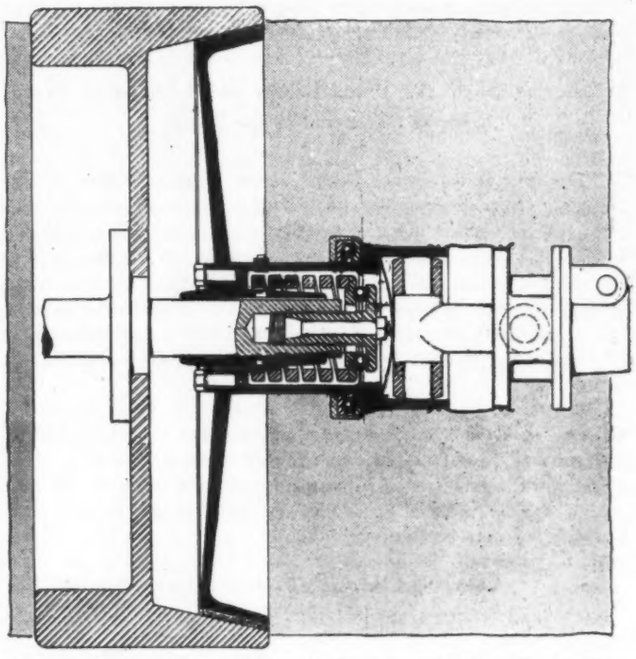


Fig. 1—Cone clutch to which brake was applied with advantage

from the neutral to the lower gear. It will be noticed, that during this gear change it is not desirable to interrupt entirely the driving connection between the motor and the primary part of the gearset. It depends on the nature of the clutch and on the driver's familiarity with its functioning whether or not the motor acceleration will produce the desired result in speeding up the primary gear to that extent, when the pitch velocities of both gears to be meshed are equal.

Cone Clutches Disengage Readily

Cone clutches without springs for gradual engagement generally can be very readily disengaged from the motor. A slight motion on the clutch pedal might be sufficient to disconnect the motor and the primary gear and consequently, although the motor will accelerate as mentioned the velocity of this primary gear will not increase and therefore the lower ratio gears will be clashed. The result is still worse if the clutch is equipped with a powerful brake, inasmuch as the clutch-driven member together with the primary transmission gear might be stopped entirely instead of being speeded up. Cone clutches with springs for easy engagement, as well as multiple-disk and band clutches, especially those with a more or less elastic medium between the driving and driven parts, like lining, cork inserts, etc., are easier to handle during the described period of gear changing, even when they are provided with brakes. However, inasmuch as the clutch brake is not essential here, a slight releasing of the clutch serving the purpose, the clutch brake is preferably arranged so as to act only after the clutch is already more or less out. *When going into a lower gear grating of teeth invariably will occur, if the clutch brake is very strong and acts from the moment of slightest clutch releasing motion, unless the clutch friction surfaces continue in slight engagement, during a part of this releasing motion.* That forms the reason why the gradually engaging clutch types give better results in this connection. In practice certain clutches with a strong brake incorporated in their releasing construction are purposely made with a heavy secondary

member. For instance a multiple-disk type with thick plates alternating with thin ones carries the thick ones on the driven member, the increased inertia of the latter permitting better shifting into lower gear as has been demonstrated by actual comparison of this construction with one which had thin disks on the same driven member.

The speed of the vehicle could have some influence on the unfavorable effect of the clutch brake when changing gears as explained; most often, however, this gear change will take place with the motor getting overloaded and consequently at about the same low revolutions per minute. It may be mentioned, though, that in general a quicker gear change is necessary when the motor runs slowly at the beginning, and the effects of the clutch brake are also more pronounced here than in the case of a higher initial speed.

The matter of the motor speed at the moment of engagement of the gears when making a change from one gear to another is a very important factor, especially to the novice in driving an automobile. One of the hardest things for the new driver to learn is the knack of changing gears. The main reason for this is that he has great difficulty in gauging the correct speed of the motor. It must always be remembered that the car speed at the moment of shifting is an important factor.

Motor Should Be Disconnected

The method of changing to lower gears without entirely disconnecting the motor from the transmission works perfectly in theory and also in the hands of skilled operators, but it could be rather harmful for the gears if an attempt were made to mesh a pair of them when their pitch velocities are not practically alike. In any event, to avoid possible trouble it is preferable to release the clutch entirely for a moment when the gears are coming together, whereby any shock between them will not be transmitted against a more or less considerable resistance as represented by the motor partially engaged through the clutch.

Being rather an interference when changing to lower gears with the vehicle in motion, on the contrary the clutch brake appears very essential for quiet meshing of gears from lower to higher ratio. In this case the secondary gear rotates with a lower pitch velocity, than the primary one to be meshed with it—assuming constant vehicle speed. The regulation of these two velocities can be accomplished more or less satisfactorily by the motor, disconnecting it from the gearbox and slowing it down. But it is not always feasible to slow the motor down to the exact desired revolutions per minute.

The clutch should be the principal functionary here, it serving for disconnecting the motor and also permitting to reduce in any desired rate the rotation of the primary gearbox member. This is so if the clutch-driven part has no force tending to carry it away after the driving motor parts even when it is completely released. The writer recalls a certain cone clutch Fig. 1, which had a ball thrust bearing in the releasing collar and also one between the crankshaft and the clutch spring, which acted on the driven member directly. It depended on the state of these two thrust bearings and on that of the clutch centering bearing which of the two efforts prevailed, the friction effort of the inner thrust and centering bearings toward dragging the clutch driven member after the motor, or the friction of the thrust bearing in the releasing collar tending to stop it from following the motor. This uncertainty of a complete clutch stop when it is released made a clutch brake indispensable for good gear shifting from a lower gear to a higher one. The shifting into any gear when the car is standing was particularly difficult with this clutch when without a brake, because often the rotating primary gearbox member caused grating of teeth with the stationary secondary member without meshing into it, until this grating had overpowered the tendency of the former to rotate. On the other hand this clutch permitted an easy meshing on the road from high into lower gear. The change to a higher gear with the vehicle in motion was better than when stationary, though the releasing of the clutch could not stop entirely the spinning of its driven member without application of the brake. On account of all the above this clutch had to be equipped with a brake, but this was made adjustable and it came in action only after the clutch was partially disengaged. Thus, when starting the vehicle one generally pushes out the clutch entirely, stopping its driven member by the brake. When changing to a higher gear with the vehicle in motion this operation automatically is done in a very short time, the driver releasing the clutch only for a moment and often merely partially. This slows the driven member without stopping it, thus giving again good gear meshing. The gear change on hills, from higher to lower gear remained easy, because the clutch had to be pushed out very little inasmuch as it had no springs under the leather. The brake, not coming into action here, could not prevent the driven clutch member from gaining some speed with the motor during the time when the gear changing passed through neutral. It took a little practice and the gears could be meshed quietly on any occasion.

It is of interest to give here the data of this clutch relative to the inertia of its driven parts and braking effort on the same, because these figures may be used for comparison with other clutches. The idling motor speed is about 250 revolutions per

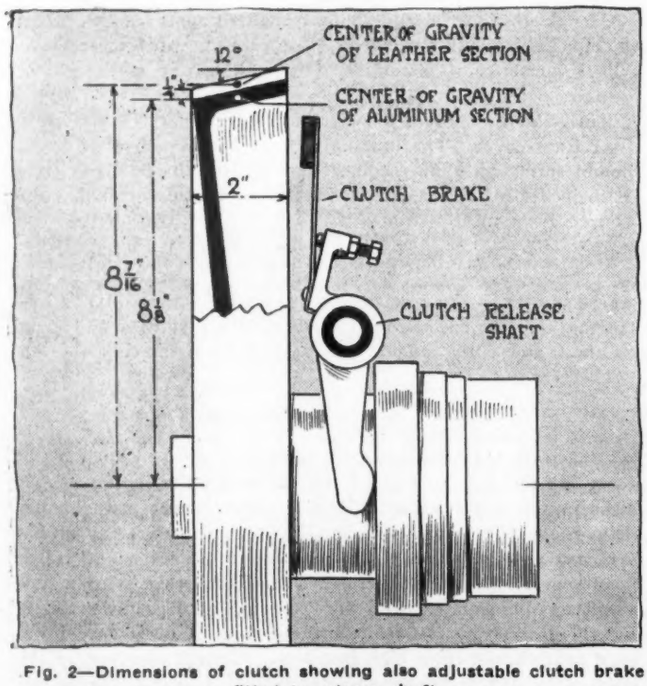


Fig. 2—Dimensions of clutch showing also adjustable clutch brake fitted to release shaft

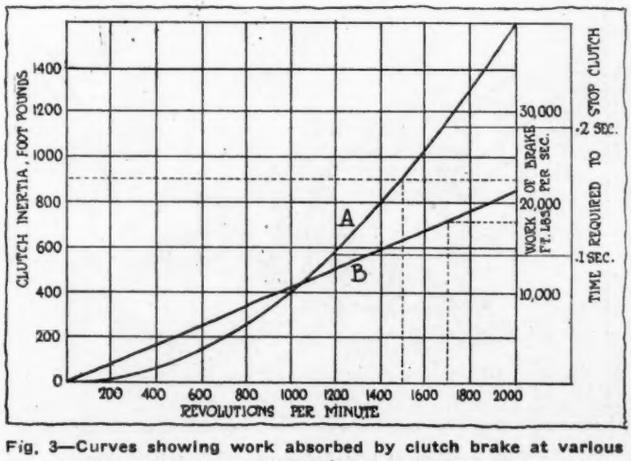


Fig. 3—Curves showing work absorbed by clutch brake at various speeds

minute. The clutch dimensions are shown in Fig. 2. The total inertia can be written as being composed of the inertia of the different clutch parts:

$$T = \Sigma \frac{Mv^2}{2}$$

The mass M_l of the leather band is

$$M_l = \frac{.036 \times 2\pi \times 8.437 \times .250 \times 2}{32.16} = .0297\text{—its inertia:}$$

$$I_l = \frac{.0297 \times \left(\frac{2\pi \times 8.437 \times 250}{12 \times 60}\right)^2}{2} = 5 \text{ foot-pounds.}$$

The mass M_r of the aluminum cone rim is:

$$M_r = \frac{.093 \times 2\pi \times 8.125 \times .375 \times 2}{32.16} = .111\text{—its inertia:}$$

$$I_r = \frac{.111 \times \left(\frac{2\pi \times 8.125 \times 250}{12 \times 60}\right)^2}{2} = 18.0 \text{ foot-pounds.}$$

Total inertia including clutch leather rivets, cone spokes, etc., can be estimated at $I = 25$ foot-pounds.

Assuming that the friction effort of the thrust release bearing equals the friction of the spring thrust and clutch centering bearings, the clutch brake should be considered as the only means serving to stop the cone from rotation. The clutch brake acts directly against the back of the clutch cone as in Fig. 2 and its spring presses the fiber pad with a force of about 12 pounds. The braking moment of this arrangement with a co-efficient of friction .20 between fiber and aluminum figures as:

$$T = \frac{12 \times .20 \times 8.5}{12} = 1.7 \text{ foot-pounds.}$$

Under assumed conditions this brake can stop the cone after it turns a number of times

$$R = \frac{I}{2\pi \times T} = \frac{25}{2 \times 1.7} = 2.33$$

This action is fast enough for any gear meshing when starting the car. Practical observation of the clutch brake action confirms the foregoing calculation and from this one can derive that the calculated figures for clutch inertia and the corresponding proper brake moment could be recommended for practice in similar cases. Of course the rate of action of the brake is different at different motor speeds when disengaging the clutch. Whereas the clutch inertia increases with the square of the motor speed, the work performed by the brake remains simply proportional to this speed. Illustrating graphically for the described clutch, curve A, Fig. 3, represents the clutch inertia and curve B the work of the brake during 1 second acting with the initial revolutions per minute. The desacceleration as caused by the brake action remains practically constant regardless of the motor speed. From the equation conecting acceleration j, velocity v, and time t which is, $v = jt$, it will be noticed that the time required to stop the clutch will increase in a rate equal to the initial speed, in other words, to the initial clutch speed, or curve B, Fig. 3 could represent also this time in a proper scale, as indicated there.

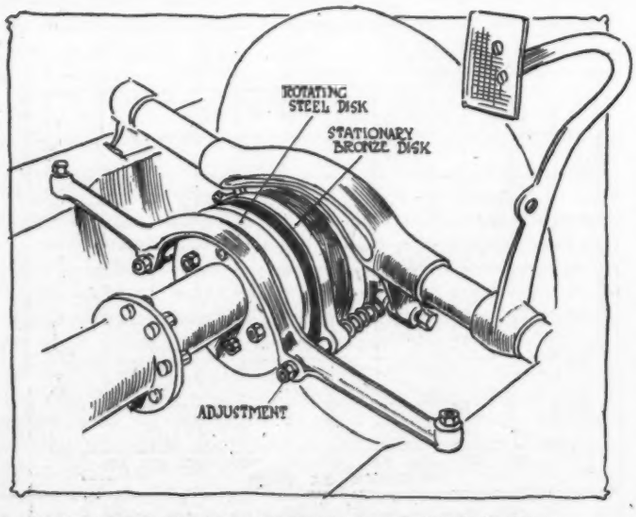


Fig. 4—Conical and flat types of clutch brakes

The foregoing example dealing with a cone clutch without springs under its leather, afforded an opportunity to study the subject in figures, assuming that a very slight motion withdrawing the cone from the driving flywheel is sufficient to disengage them entirely. It is well to compare these obtained figures with those of clutches with provision for gradual engagement, and in which therefore the driving member continues to drag along the driven one during a great part of the clutch releasing movement, especially if the latter member rotates with little resistance as for instance when the gears are neutral and no clutch brake is provided.

It should be mentioned that a cone clutch of similar dimensions to the above, with the same style and strength of clutch brake but with spring plungers under the cone leather for gradual engagement, invariably caused tooth grating, unless the cone was pushed out to the extreme of its motion. It is proper to deduce, that in this case the available braking effort was not sufficient to overcome the tendency of the clutch cone to follow the flywheel during the beginning of the clutch releasing travel, because the range of friction between the flywheel and the cone became greater on account of the spring plungers under the leather.

Multiple-Disk Is Easy Engaging

A multiple-disk clutch with lining or with cork inserts is a fair example of the easy engaging type. The inertia of the disks will be figured in an approximate manner by assuming a mean velocity v for the whole mass of the disk, this velocity v being that of the mean radius of the disk. The mass of the disks in one example of a clutch with cork inserts equals $M_d = .34$.

The inertia of the disks at 250 revolutions per minute totals:

$$I_d = \frac{M_d \times v^2}{2} \qquad \frac{.34 \times \left(\frac{2\pi \times 4.8125 \times 250}{12 \times 60}\right)^2}{2} = 19.5 \text{ foot-pounds.}$$

The clutch drum inertia similarly figured approximates 7 foot-pounds, which with the inertia of other parts can bring the total clutch inertia of its secondary or driven part to about 30 foot-pounds.

This clutch is provided with a brake incorporated directly in its release cover. The braking is done by the action of a 360-pound spring on a fiber collar 3.406 inches outside diameter by 2.219 inches inside diameter. The torque of this brake is to be figured from the equation

$$T = \frac{P \times f \times (Z_2^2 \times Z_1^2)}{2Z_2}$$

where are P — the total acting pressure on the collar = 360 pounds, f — the coefficient of friction of greasy fiber and metal = .10, Z_2 and Z_1 the outside and inside radii of the collar.

Therefore,

$$T = \frac{360 \times .10 \times (1.703^2 + 1.109^2)}{2 \times 1.703 \times 12} = 3.62 \text{ foot-pounds.}$$

Comparing these figures with those of the cone clutch in the foregoing, it will be noticed that although the inertia of the disks in this multiple-disk clutch is about 20 per cent. greater than in the cone clutch, the braking torque used is about 213 per cent. greater. This multiple-disk clutch gives a very satisfactory performance in practice. The clutch brake is of a type which acts immediately with the beginning of the clutch release, and therefore it necessitates the great mass of disks used for a good gear charge from high into low. A slight pressure on the pedal is enough to release the clutch so that gear changing can

Among the New Books

Many Technical Works of Interest to The Automobilist Are Announced By the Publishers

THE spring crop of technical books is now available for the manufacturer of automobiles as well as the student and interested owner. Many of exceptional merit have been recently sent to press and THE AUTOMOBILE will publish a short explanatory review of these as they appear. The following are offered for sale at the present time and should meet the popular demand.

MAGNETO AND ELECTRIC IGNITION. By W. Hibbert, A. M. I. E. E. Published by Whittaker & Company, New York City. 154 pages, 4 by 6 inches, with 90 illustrations. Cloth, $0.70.

Some time ago the same author brought out a work entitled "Electric Ignition for Motor Vehicles" and it is this which has furnished the basic idea for this later book. This work takes up the basic principles of the electric ignition system and by simple analogies carries them through so that they may be understood by a reader who is not trained in electrical terms. All types of ignition systems, both high and low tension, are discussed.

THE FREEZING POINT, BOILING POINT AND CONDUCTIVITY METHODS. By Harry C. Jones, Professor of Physical Chemistry in the Johns Hopkins University. Published by the Chemical Publishing Company, Easton, Pa. 75 5 by 7.5-inch pages; illustrated. Cloth, $0.75.

This work treats of three methods of chemical analysis. First, the application of the freezing-point method to the determination of molecular weights and to the measurement of electrolytic dissociation. Second, the application of the boiling-point method to the determination of molecular and electrolytic dissociation, and, third, the application of the conductivity method for the solution of the same problems.

GAS POWER. By C. F. Hirshfeld, M.M.E., and T. C. Ulbricht, Cornell University, published by John Wiley & Sons, New York. 209 pages, with sixty illustrations. Cloth, $1.25.

This book consists of eighteen chapters, of which the first three are devoted to a study of the theory of the gas engine and its fuel. The next two chapters are devoted to the historical development of the gas engine and its modification, while the remaining chapters take up the cooling, control, ignition, carburetion, classification, etc., of modern motors. Stationary, marine and automobile engines are taken up along with a short chapter on gas producers. Each chapter of the work, in treating of its subject, follows the development of that particular part of the gas engine from the early times up to modern practice. For instance, the chapter on ignition has one article devoted to a history of ignition, bringing in such devices as the open flame, etc. The earlier forms of electric ignition are then discussed and finally, examples of modern practice are given. In concluding the work the author dwells on the performance of different motors and the effect of different possible gas engine conditions.

DICTIONARY OF AUTOMOBILE TERMS. By Albert L. Clough, published by the Horseless Age Co. New York. 357 pages, with numerous zinc illustrations. Cloth, $4.00.

Everything from A to Z in the automobile line is defined in this work. It would no doubt be a handy book for the struggling layman in reading some of the technically involved automobile literature now extant. The work is arranged in alphabetical order and is, as the title suggests, a dictionary.

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occur between any of the available combinations when the vehicle is in motion. On changing to low gear this slight release gives the partially engaged clutch a chance to follow the speeding up motor, overcoming the retarding effort of the brake, if the motor were loaded hard under the high gear and, retaining a fair throttle opening, quickly picks up during the moment when passing from one gear to another. When changing to a higher gear equally good results are obtained because the motor generally is more or less shut down during this operation and consequently it does not increase the speed of the disks so readily above the desired amount, nevertheless preventing them from being stopped entirely by the powerful brake action. It is only when in neutral with the vehicle at rest that the clutch must be pushed out to its limit, so that the disks disengage entirely and consequently can be stopped by the brake. It is a matter of construction which makes this clutch brake always act when releasing the clutch. That is the reason why this type of clutch has also proven less satisfactory with light disks on the driven drum instead of the heavy ones, the lighter disks making more difficult a proper change from high to low gear when the car is in motion.

The two cited examples give reliable figures for two extremes of clutch types as encountered in practice—one possessing sudden release and engagement, the other very gradual. It should represent little difficulty to estimate from figures of these examples the necessary data as to clutch inertia and corresponding clutch brake capacity for any ordinary case, for instance, when preparing an experimental design. The final dimensions, however, would have to be settled through trial, because individuality is apt to vary the results and also the requirements of what is to be considered satisfactory clutch and clutch brake action.

Referring to constructive features of clutch brakes it is well to indicate some of their peculiarities from a few actually used designs. The design shown at the left in Fig. 4 is unsatisfactory, because the metal cone brake acts very suddenly and strongly, it being strong enough to exert a very noticeable brake action on the motion of the vehicle proper when the gears are in mesh, as is the case when coasting down hill with a free engine. On the other hand, it acts at the extreme end of releasing motion, which does not cause much trouble for quiet gear meshing when the vehicle is in motion. This construction has given place to another one of the same make, shown to the right in Fig. 4, the flat brake being less sudden and powerful. Both types of brakes would show a very appreciable amount of wear, when used often, with gears in mesh. It is desirable to have the clutch brake act gradually, for instance through an elastic medium. Fig. 5 shows a brake backed up by springs, another variety having been given in Fig. 2. These two types should be the most satisfactory, because they permit adjustment of the clutch brake as to force of action and also as to the moment of action.

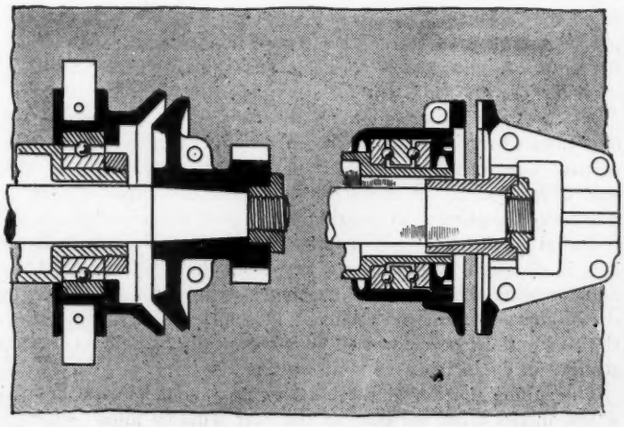

Fig. 5—Bronze to steel clutch brake used on the Lozier

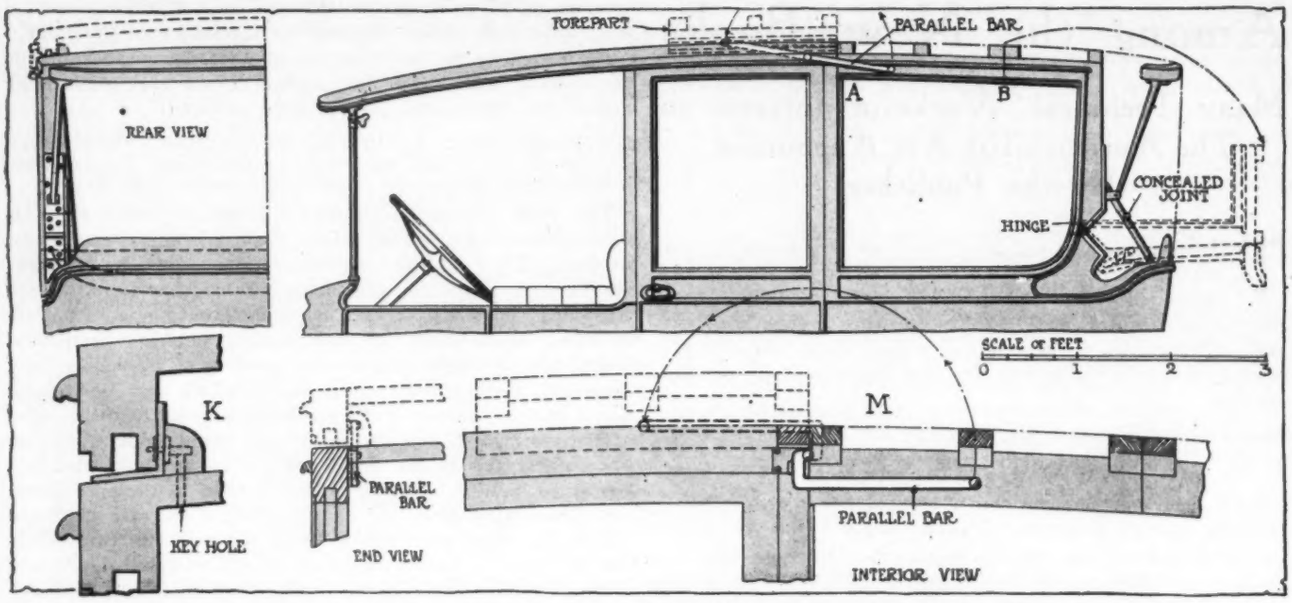

Fig. 1—Scale drawings of folding top for limousine-landaulet, showing also alternative method of fitting parallel bars to the top section

Folding Tops for Limousine-Landaulets

Three Alternative Methods of Construction Show Simplicity of Operation —Neat Appearance Obtained by the Use of Concealed Supporting Joints

IN this article constructive details are given of three hoods designed to fit the new Limousine-Landaulet type of body which was described more generally last week. It will be seen on referring to the accompanying scale drawings that all three designs of hood are identical as far as outside dimensions and points of division are concerned, differing only in the method of hinging and supporting the rear portion when lowered.

The older form or that used on the first cars brought to this country, is shown in Fig. 1, which comprises a side elevation and half rear view. The body is shown stripped of the leather covering so that the construction can be more clearly seen. The top in its folded position is indicated by dotted lines and the arc of travel by arrow marks.

The fore section, or that part of the top between the points marked A-B, is movable and is placed on top of the permanent roof, being controlled and guided by two parallel bars, that are placed one on each side. This top section rests on angle irons. the same length as the top section, which are fitted permanently to the roof.

To fasten the top section on the roof, there are two spring box locks of the regulation pattern, fastened to the inside of the vertical web of the angle iron as shown at K so that the lock bolt is horizontal. A wood block covers the exterior part of the lock completely, preventing the entry of water. On the lower side the key hole extends through the roof, and the lock is operated by inserting a key from the inside of the body and throwing the bolt until it engages with a slot on the inside of the toprail of the top section. This lock in conjunction with the side parallel bars form an effective means of holding the top section firmly in place without rattling.

The falling portion of the hood swings about a point situated a few inches from the base of the rear window pillar, where a particularly strong hand forged hinge is fitted. Great strength is necessary here as the entire strain of the lowered top is taken by the hinge.

The shape of the hinge opening is such, the cut of the pillar being at 45 degrees, that when down the hinge forms its own stop. This is clearly shown in Fig. 1.

A concealed jointed rod is used across the angle of movement to contribute to the support of the top when raised. A great deal of strain is thus taken off the top fasteners. In order to throw this joint, the upper end is fitted with a square nut, to which a key can be applied and the joint broken preparatory to falling the top. The opening in the trimming through which the key is fitted to the joint is covered with a flap of the trimming material. This concealed joint is short on account of the limited space for folding when the top is down, and also by the fact that the body is round at the rear corner. Consequently the lower end of the joint cannot be put very far back. This joint is shown both in its raised and lowered positions.

The toprail rear of the cut B is framed solid to the pillar and when lowered occupies the position indicated by the dotted lines. The sizes of the framing material of the bows and pillars are the same as used on the ordinary landaulet, with the exception of the rear pillar and the rear bow. This pillar is made wide on the side to allow stock for a generous bearing surface for the lower hinge. Below the hinge and above the moulding, the wood is also higher up than usual, on account of the tendency of the leather to fold or creep under at this point when lowered. The wood filling prevents this and holds the leather in place.

The rear bow is made of ample proportions and the corners are rounded to follow the shape of the body.

The fasteners used are the regulation landau top pattern, two being used at each cut. In addition dowel pins and plates are used at each end and in the center of the bows.

This design of top construction has a practical value in that part of the top is placed where weight does not count, over

one-third of the total weight of the top, or rather that part of the top that falls, being supported overhead. It has the slight drawback, however, of being rather cumbersome to shift.

An alternative method of attaching the top section is shown at M, Fig. 1.

A partial end view shows the relation of cranked parallel bars, which are arranged inside the body, to the toprail. These bars operate in precisely the same manner as the outer bars in the first design, but being inside permit a much cleaner external appearance to that part of the body. They are plated, and their presence does not detract from the appearance of the interior.

Both positions of the top are shown in the drawing, which shows also how the bent part of the bar passes round the roof top rail, occupying a perfectly flat position on top and out of sight.

Fig. 3 is another method of construction that is very popular today, owing chiefly to its trim appearance, and despite the very serious weakness of having so much weight overhanging the bearing point when the top is down. Practically, the lower hinge is the medium of supporting the entire top. As in Fig. 1, this hinge is hand forged and very strong.

The movement of the parts when folding are indicated by the arrow marks, the cuts at C and D correspond to those of A and B of Fig. 1. The hinge I is the regulation landau three prong hinge, one member of which supports the bow. The hinge at the cut D is similar to a straight door hinge, only narrower, and it is fastened to the inner wall of the toprail only. Landau top fasteners are used, two being placed at each cut under the bows. In addition there are two more used at the cut D, one being placed at each side on the inside of the toprail. Further security is afforded by the use of dowels and plates at the ends and in the center. Grab handles are placed one at each side under the cut C to control the lowering and raising of the top.

The weight of the top when down will insure its staying reasonably steady. Between the members that touch, rubber blocks are fastened to insure silence and protection of the surfaces.

Point J on the side elevation of this figure represents the extreme rear point that bearing for the top when down can be established. There is an overhand of 26 inches from this point to the extreme rear edge, and a distance of 7 inches between it and the center line of the lower hinge pin. Taking into account the weight of the leather covering, this would seem, from the figures, to be a rather dangerous overhang, but as many are in use it can only be deduced that constructional strength of the hinge meets the situation. Its neat appearance evidently more than compensates for this apparent mechanical defect, for this type is the most popular of the methods employed.

In this, as in other features of automobile construction, care in the building as well as in the subsequent handling goes a great way towards producing satisfactory results.

A method that overcomes the slight mechanical weakness of the previous design is shown in Fig. 3. The construction is identical with the exception that an outside joint has been substituted for the concealed joint in Fig. 2. The lower joint Fig. 3 extends beyond the actual body length and the bearing point of the top when down, is 18.5 inches from the back end and 14.5 inches from the center of the hinge. These figures are certainly more conducive to stability than those previously noted, and the life of the top will be longer under equal usage. The bearing of the top on the lower joint prop is an iron support that extends downward from the upper joint prop. When the top is raised this support is concealed back of the joint, and when lowered it rests on the lower prop, thus making an ideal bearing.

Some Durable Color Combinations

The combination of gray body, with red striping and red running gears is durable provided first-class materials are employed. The work is performed in a thorough manner and the finish is made rich and strong with plenty of varnish.

The most durable colors, all things considered, are probably the browns, blues, greens and grays. There are so many shades of each of these colors that a very long list of colors is available from them. The present show season has shown that the above colors, including, possibly, maroon, are the favorite automobile colors today.

For a seven-passenger touring car paint the body dark Napier green and the chassis a light shade of the same color and stripe both body and chassis with double .0625-inch lines of black.

Many car owners prefer the dark shade of Napier green for the car entire with black lines of striping. This makes a finer looking car. Brunswick green, a little mellower green, dark shade for the body and light shade for the chassis, the car striped throughout with double lines of black, is another attractive combination.

Silk green, dark shade for the body and medium or light shade for the chassis, striped with two .5-inch lines of black .5 inch apart with two fine lines of gold running through the center of this space, gives a splendid effect on a big touring car. This is a very durable color and nothing in the line of greens is more attractive.

It is important for the car owner to bear in mind that any of the grays, with the exception of the very palest ones, show dust and dirt to the minimum extent, and are kept in repair at small expense as compared with some of the other colors.

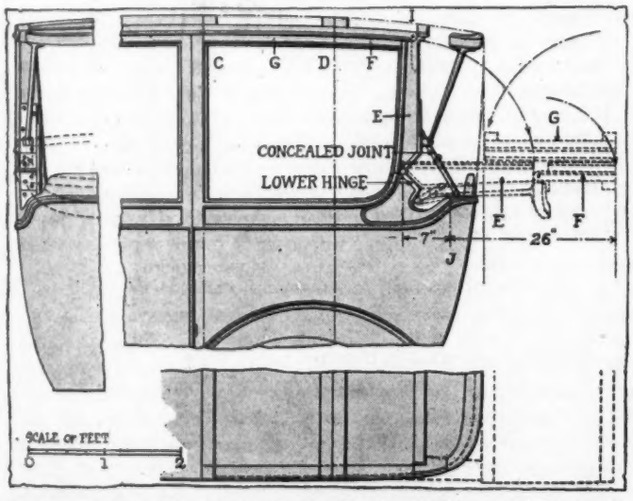

Fig. 2—Folding top design in which all operating parts are concealed within the hood

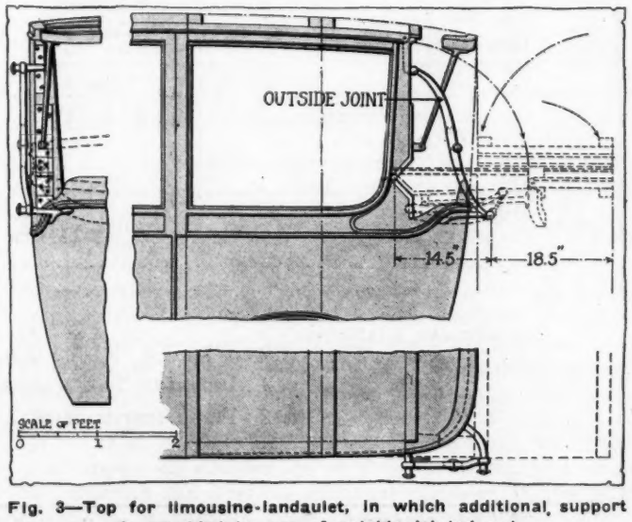

Fig. 3—Top for limousine-landaulet, in which additional support is provided by use of outside jointed rod

Truck Inspection Reports

Two Original Systems Used by New York Branches of Truck Factories

If Properly Handled the Inspection System Is a Direct Asset to Dealer and User

SYSTEMATIC truck inspection and its advantages were taken up in THE AUTOMOBILE of March 6, and in that issue a number of inspection systems used by metropolitan branches of various truck factories were described. It was shown that inspection itself is undoubtedly a valuable practice to adopt which not only helps to sell a truck but also to keep the customer satisfied when the machine is in service and thereby acts to induce him to buy another truck of the same make if he requires one.

In the preceding article on this subject a number of inspection systems were described which, with a single exception, consisted in the company periodically sending inspectors to the truck owner's place. In the case of the exception the company fixes a day on which the truck of a certain owner runs over to the company's service plant to be looked over and have necessary minor repairs made. In all cases the inspectors instruct the drivers how to make small repairs and adjustments or they make them themselves.

A procedure differing slightly from the general rule is used by the New York branch of the Knox Automobile Co. The company does not feel satisfied by having its inspectors look over its products now and then, but a special scheme for getting at the weak sides of the drivers handling Knox trucks has been evolved. This scheme includes the use of a daily report made out by the truck driver for the first 60 days after the truck has been delivered to its owner. The report is made out on a specially designed record blank, Fig. 2, which is furnished by the Knox company to the truck owner's driver with instructions to make out one every day and to send it to the branch office. As Fig. 2 shows, the card, which is 4.25 by 7 inches and printed black on tan cardboard, is so designed as to afford space for recording the work of a car done on a certain day, the miles run, the gasoline and oil used, the loads carried and the weather. Besides this there is space for entering the various stops made by the truck, with such details as indicated by the headings of the spaces in Fig. 2. The card is marked with the date and the name of the driver as well as that of the owner. On the reverse side there is a space for reporting fully all work done on the truck, the cause of all delays, troubles or accidents, no matter whether they occurred in the garage or on the road. If there are no remarks on the reverse of the card designed for this purpose, the company assumes that the driver is either operating

KNOX AUTOMOBILE CO. **INSPECTOR'S REPORT**

NAME ..... DATE .....

JOB NO. ..... ORDERED BY ..... CAR NO. .....

	Final Test
MOTOR	
CONNECTING RODS	
WRIST PINS	
VALVES	
VALVE SPRINGS	
CYLINDERS	
FAN AND BEARINGS AND BELT	
OIL PUMP AND CONNECTIONS	
OIL PUMP PRESSURE	

	Final Test		
BODY			
CHAINS		GREASE CUPS	
DRIVING SPROCKETS		POWER	
DRIVEN SPROCKETS		SPEED	
REAR AXLE		RATTLES	
FRONT AXLE		OVERLOAD	
BONNET AND FASTENINGS		GENERAL APPEARANCE	
ENGINE PAN		DRIVER	
GASOLINE TANK AND CONNECTIONS		INSTRUCTION BOOK	
MUFFLER AND CUT OUT		TIME OF ARRIVAL	
MUD GUARDS		TIME OF LEAVING	
ODOMETER RECORD ..... MILES		INSPECTED AT	

.....

.....

.....

INSTRUCTIONS TO INSPECTOR:

Check above items if O. K.—If not O. K., state the trouble or condition. If corrected by Inspector, mark "Rep'd."

No. 1 INCOMING TEST MADE BY .....

No. 2 FINAL TEST MADE BY .....

Fig. 1—Inspectors' report blank used by the New York service department of the Knox Automobile Co.

the truck perfectly or neglects the preparation of full and correct records. An inspector is therefore sent to look over the truck and to watch the driver's work. Thus, in the course of 2 months, the driver is made acquainted with all the various parts of the mechanism. Thereafter an inspection is made every month, which is very similar to the inspections of other companies, including, as it does, a careful examination of the mechanism, watching for noises, squeaks and lost motion, etc. Small repairs are made by the inspector or by the driver under his supervision. After the inspection is over, the inspector returns to the service department of the company and fills out his report, Fig. 1, a blank printed black on white paper, 8.25 by 10.75 inches. This blank provides spaces for filling in the name of the inspector, the job number—all the jobs are numbered consecutively—the name of the truck owner and the number of the truck, as well as the date of the inspection. The inspector, as he goes over the various parts of the car, checks them on the report form, if they are O. K., while if this is not the case he states the trouble of each specific part on the form. If he makes a repair himself, he states so on the report. The same blank is used for testing trucks before putting them in the repair shop and in this case a final test is made after the work is completed to see whether or not the troubles have been eliminated. The inspector making the test signs the report, which is filed in the office of the service department, ready for reference at any time.

Autocar Prefers Night Inspection

Another original and apparently very efficacious system is used by the Autocar Co.'s New York branch. This company sends out its inspectors every 60 days, and, while most concerns try to have their inspectors work in daytime, the Autocar practice is to give nightly inspection service wherever possible, so as to interfere as little as possible with the business of the trucks. As a matter of fact, half the Autocars in New York are inspected at night. Here, too, an inspector makes his calls at intervals of approximately 60 days and when going to see a truck he inspects it in substantially the same manner as other company's inspectors do their trucks. If necessary he takes out the machine and gives it a road test to find out troubles which are not developed by an inside inspection and test. He makes his notes, instructs the driver as to what is necessary, makes slight repairs and adjustments or shows the driver how to make them and then return to the company's service department. At the office of the latter he fills out a report stating what parts of the truck are in need of repair, what repairs he himself has made, which seem to be the characteristic faults of the driver, and so forth. He turns over this report to the office of the service department. There the report is given a number—all inspections are consecutively numbered from the beginning until the end of the year—and every day the reports of the previous day are typewritten on several sheets with four carbon copies. One of these sheets is cut up and the reports are sent to the various truck owners, calling their attention to the troubles with the truck and the repairs required, if such are necessary. One set of sheets is filed in the office of the service department for future reference; the second is sent to the maintenance engineer's office, the third to the service department's shop and the fourth is used for the owner's reports mentioned above.

Inspection Records As Money Savers

This system has the advantage that if a truck owner comes in at some time or other, claiming that a certain part of his machine is not up to specifications, he can be shown that it was his driver who neglected to properly care for the part and that he, the owner, was advised of that once or repeatedly. In this way the inspection report is an actual money saver to the company and prevents abuse of the guarantee by truck users whose machines are not treated properly.

Of course, as the reports are filed numerically, a key for reference to the truck owners' names is necessary to make the system ready for reference at a minute's notice at any time. For this purpose a card file is used which contains records of all inspections made on all trucks in the Metropolitan territory. There is a car for each truck in the territory, filled out like the sample, Fig. 3. By reference to a record card it is easy to put before an owner, within less than half an hour, the records of all inspections made on one or all of his trucks and to show him what are the causes of inefficient operation, if such is in evidence. The cards are filed in order of the owners' names.

Daily report of **KNOX** automobile in the service of

.....

Driver .....Date .....

Called at	Time of arrival	Time of leaving	Miles (Odometer)	Weight of load	Unloaded lbs.

CAR NO.....CAPACITY.....LBS.

WEATHER .....TEMP. .....

ROADS .....KIND OF LOADS .....

GASOLINE USED .....OIL USED .....

MILES PER GAL. .....MILES PER HOUR .....

Important—Write remarks on other side.

Fig. 2—Driver's daily report blank for Knox trucks

INSPECTION CARD

Name John C Smith & Co

Street No. 15 William St Town N. Y. State N.Y.

Date delivered Oct 15-1912 Salesman Mullins

Chassis No. 10001 Eng. No. 14732 Type 21-OC

DATE	REPORT NO.	INSPECTOR	DATE	REPORT NO.	INSPECTOR
12/16/12	1723	D. Weed			
2/22/13	248	F. Spelle			

Fig. 3—Autocar Co.'s inspectors' record file card

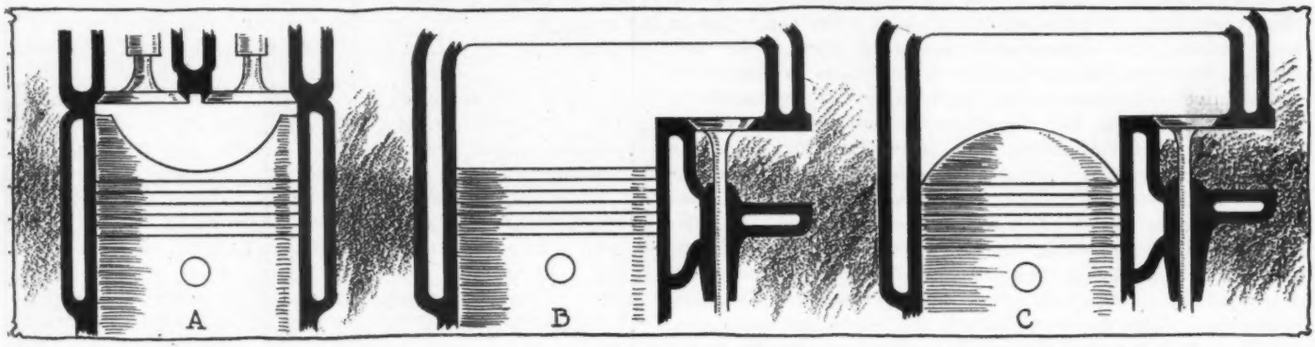

Fig. 1—Three shapes of piston head: A, concave, giving hemispherical combustion chamber; B, flat, easy to construct and used in general practice; C, convex or dome head, modified form often used. Gives strong piston owing to arch effect

What Is Rubbing Brick?—Dimensions of Racing Motors—Sand Box for Automobiles—Different Piston Heads—Chamois for Straining Work—Adjustment of E. M. F. Carbureter—Economy of Fours and Sixes

Rubbing Brick a Composition

EDITOR THE AUTOMOBILE:—In your issue of September 12, 1912, there was an article on page 523 in regard to painting a roadster, in which you said to use a rubbing brick. Kindly advise me what this rubbing brick is.

St. Louis, Mo. G. N.

—Rubbing brick or stone is a composition stone used for rubbing down rough stuff or other coarse surfacing material applied to the body of the automobile in order to get a level and smooth surface.

This rubbing brick or stone is a composition material which during the last 20 years has superseded the natural blocks or pieces of pumice stone formerly used to rub a body of pigment to a level and smooth surface. It is superior to the natural lava or pumice stone in that, unlike the latter, it does not crumble and chip off during use thus alowing the coarse particles to get under the stone and cut and mar the surface. Probably the best known rubbing brick is made in Germany, large quantities of which are used by carriage and automobile painters in this country. Excellent rubbing stone is, however, made in this country. An American-made stone known and used in practically every corner of the country by carriage and automobile painters is known as Eureka rubbing stone. This stone is doubtless obtainable in the St. Louis paint supply stores.

Bore and Stroke of Big Motors

Editor THE AUTOMOBILE:—Kindly let me know the dimensions of the Jay Eye See and the Jumbo Benz racing cars.

Pittston, Pa. R. M. S.

—The bore of the Jay Eye See is 9.33 inches and the stroke 8.625 inches. The car is a four-cylinder Fiat.

The bore of the Jumbo Benz is 175 millimeters and the stroke 200 millimeters. It is a four-cylinder car of Benz manufacture. The features of design of these special racing cars is kept secret by the factories which produce them as the rules of racing do not require that the dimensions be made public.

Automobile Ejector Sand Box

Editor THE AUTOMOBILE:—The following is suggested as a device for preventing skidding on asphalt and other slippery surfaces:

In Fig. 2 is shown a device for shooting sand beneath the tires and checking thereby the tendency for a car to skid. The mud guards are made hollow and contain a supply of sand. They are filled through a filler opening on top. A lead is taken off the exhaust pipe and by pressing a pedal the valve is opened and sand flows by gravity from the box and is then shot by the exhaust beneath the tire.

Chicago, Ill. SUBSCRIBER.

Effect of Piston Head Shape

Editor THE AUTOMOBILE:—1—What are the advantages of a concave piston?

2—Does a concave piston draw in any more vapor than a flat-top piston, same bore and stroke?

3—Does a concave piston make a low-compression engine?

4—A says a long-stroke motor uses less gasoline than a short-stroke. B says a long-stroke uses more. Which is right?

Lawrence, Mass. W. R. MOORE.

—1—The advantage of a concave piston may be perceived by a study of the three types shown in Fig. 1. The concave piston helps to reduce the area through which heat is lost. It gives the hemispherical combustion chamber, which is ideal in a motor which is small enough to use a non-water-cooled piston. It has the disadvantage of being costly to construct and to be of such form as makes a bad casting. The difficulty in the latter respect is to have it cool without cracking, to leave the material internally unstrained and to avoid projections. The convex piston, on the other hand, does not give an ideal combustion chamber shape, but is used to some extent on account of the structural strength due to the arch effect of the piston. The flat top is cheaply made, avoids pockets, although not as good as far as shape is concerned as the concave combustion chamber.

2—The concave piston will draw in the same amount of charge as will any other piston having the same piston displacement and volume of clearance.

3—The compression space with a concave piston is limited because the walls of the piston are higher than the center of its head. This does not signify that the motor must be of the old compression type because the stroke of the motor may be long enough to cause the relative volume above the piston to be very small and hence give a high compression.

4—It is generally conceded that the long-stroke motor is as a class more economical in fuel than the short-stroke. THE AUTOMOBILE published curves in the issue of March 20 on page 689 showing a record of tests made by the Moline company on long and short-stroke motors.

Adjusting E. M. F. Carbureter

Editor THE AUTOMOBILE:—I have an E. M. F. 30, which I bought the latter part of 1911. It has been running comparatively little and is in good condition. I am quite sure the carbureter is out of adjustment. Until lately it ran very well, but now it won't run on high gear. Please give me detailed information as to adjusting carbureter on high gear. Do you think there could be anything else that would affect its running on high gear except adjustment of the carbureter?

Saluda, S. C. A. E.

—There is only one adjustment on the E. M. F. carbureter. It is located on the upper side of the carbureter, as shown in Fig. 4, at A. The function of this valve is to permit the proper amount of air to be drawn into the carbureter to meet the requirements of the motor under different atmospheric and temperature conditions. In extremely cold weather the carbureter requires less air than that provided by the factory adjustment and in hot weather more air may be admitted. To give the carbureter more air loosen the thumb lock nut B provided on the valve stem and turn valve stem to right. To give less air valve stem is turned to left. In setting the carbureter open the throttle valve on the steering wheel until it is about one-fifth open with the motor running. Turn auxiliary air valve stem to left for about five turns and then turn back slowly until the point is reached at which the motor seems to run best. The probabilities are that the carbureter on your motor is getting too much air and for this reason misses when the car is turning over slowly as when pulling on high gear. A turn or two to the left on the valve stem A will probably cure the trouble. It is best, however, to start the motor and turn the valve as stated until the best running is secured.

The trouble with your motor probably lies in the carbureter adjustment, as you state, although it may be one of the following: Too large gaps of the spark-plug, weak magneto, faulty wiring or carbon. The carbureter adjustment should be tried first. The spark gaps should be 1-32 inch or less.

Four Uses Less Gasoline

Editor THE AUTOMOBILE:—I would like to know how much more fuel will a six-cylinder motor use than a four-cylinder to the mile, both being of the same size motors. My friends tell me that a six-cylinder car uses as much as a four-cylinder car. I cannot see it that way.

Great Meadows, N. J. J. M. REED.

—Giving the same horsepower and the same degree of good workmanship, the four-cylinder motor is more economical than the six. It must be remembered that one-third of the power contained in the gasoline fed to the motor is lost through the cooling water. This proportion of power lost depends on the amount of wall surface exposed to the cooling water as compared to the piston displacement of the motor. Since the surface is greater in the six than the four proportionally when the same horsepower is considered for both motors, the heat lost through cooling is greater proportionally in the six, therefore more gasoline is thrown away through the walls in a correspondingly less amount available for driving the car. This makes the four more economical than the six, even leaving aside greater frictional resistance, weight, etc.

Where the six shines is in its even torque output. Since the power strokes overlap each other the power is delivered smoothly and at an almost constant rate. Vibration is practically eliminated.

Misfires When Running Idle

Editor THE AUTOMOBILE:—I have an Amplex motor car which will misfire even when running idle. How can I remedy this trouble?

Winthrop, Mass. R. D. P.

—The seat of trouble on your car may lie in either the ignition system or the carbureter. It is more probably in the former than in the latter. In the ignition system the principal causes for misfire when the motor is turning over slowly are the weakness of the magneto, too great a gap at the spark-plug points, partially short-circuited coil, bad connections or improperly adjusted coil. In the carbureter the causes are either mixture which is too rich or one that is too lean.

In order to get the ignition system firmly in mind a diagram is shown in Fig. 6. The troubles outlined for the ignition system may be taken up one by one and the cure for each shown.

The magneto generates its electric current by inducing a flow through the windings on the armature which cut the lines of magnetic force extending between the pole pieces. When the magnets become weak, the intensity of the magnetic force is diminished and as a result the amount of current induced at low speeds is insufficient to produce a good spark. The remedy for this is to take the magneto to the nearest branch of the manufacturer and have the magnets recharged.

When the gap between the electrodes is too wide the current required to jump it is greater than when the gap is small. Besides this, the spark which is produced in leaping the gap is thinner. At low speeds the current is often insufficient to jump the gap and as a result the cylinder misfires. The gap should be not less than 1-64 inch in width and not more than 1-32 inch.

A short circuit through a part of the windings of the coil generally results in a total inability of the ignition apparatus to produce a spark, rather than in its missing at low speeds. The

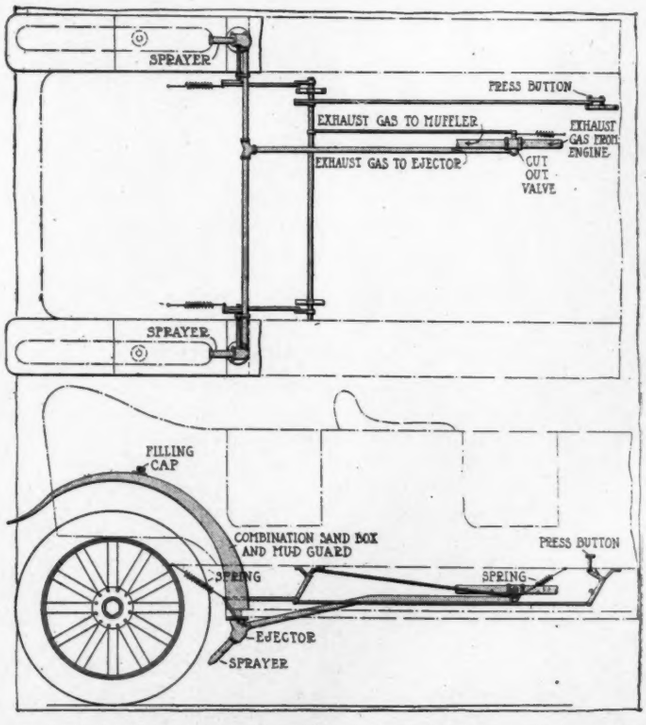

Fig. 2—Diagram showing operation of sand box on mud guards. Operated by exhaust pressure through ejector

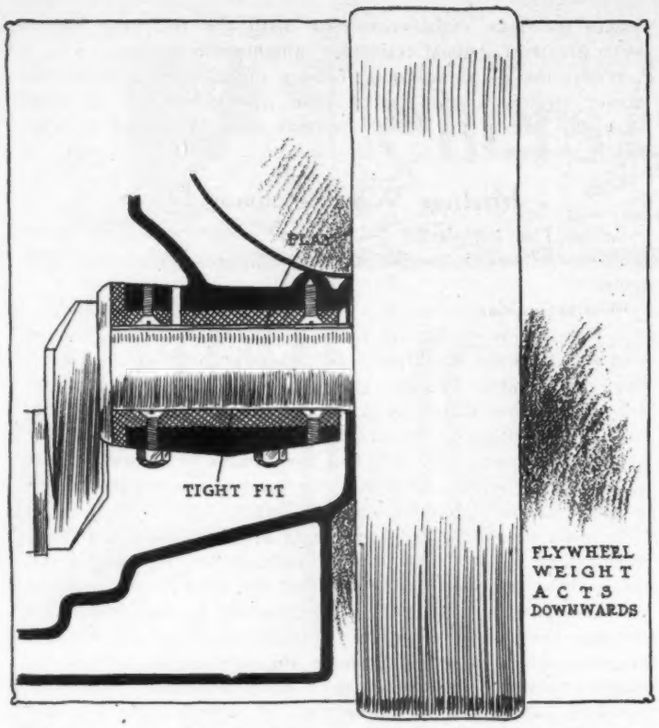

Fig. 3—How the flywheel conceals a loose bearing and thus makes it difficult to locate knock

result of such a coil condition is the same as if a coil of too small a capacity were used and the current is not boosted to a high enough voltage to jump.

Bad connections in the wiring increase the resistance to the circuit. The voltage drop in any circuit is proportional to the resistance in that circuit. It is very well possible that the current would be sufficient to produce a spark at high speeds and not enough at low speeds. It would therefore be wise to go over the wiring.

The vibrator adjustment is not apt to be at fault in this matter. It would be well though to look at the platinum points on the coil trembler and see if they are flat, and also to try a lighter and a heavier adjustment on the trembler spring. There is a possibility that this will make some improvement.

Too weak a mixture will cause a cylinder to misfire. Even with the best-designed manifolds, when the mixture is very weak, one or two cylinders will fire better than the others. To improve this condition, open the needle valve or give the carbureter less air. Too rich a mixture does not often cause misfiring, but it does occasionally happen. First try the effects of closing the air valve or opening the needle and then if this produces no good effect, try the other.

Chamois for Straining Purposes

Editor THE AUTOMOBILE:—I am the patentee of an automobile gasoline strainer which includes in operation a chamois skin. I propose to market the device myself through agents, having arranged for the manufacture of same. I would like very much to obtain some advice from you relative to the kind and quality of proper straining medium and other matter.

1—Are the so-called chamois skins, thousands of them, used for straining automobile gasoline, real genuine chamois skins or are they mostly sheep or goat?

2—Will goat skin suffice as well as chamois skin for the purpose?

3—Is it washable and is it not considerably cheaper than chamois?

4—What grade of chamois, goat or sheep do you advise? Is not chamois or sheep which can be washed best for the purpose—or can all grades of said skins be satisfactorily washed?

5—Will you kindly refer me to the best and cheapest source of supply for skins, chamois, sheep and goat?

6—Would not my nearness to original source of supply for skins make it possible for me to buy cheaply?

7—From what importers do you suppose I could get the best figures? It seems most skins used are imported.

8—Would domestic skins suffice as well, and what would be my nearest to original source of supply for them?

9—In what size quantities do you suppose I would have to order from foreign exporters in order for me to import skins, or would I have to be a recognized dealer?

Sedan, Kan. E. C. COURTWRIGHT.

—1—The majority of skins used for straining gasoline and which are called chamois skins are in reality sheep skins.

2—There are a small proportion of goat skins, but these are not manufactured to such a large extent, although satisfactory.

3—These sheep skins are washable, as are also the goat skins and the genuine chamois. The latter, however, are too expensive for extensive use.

4—The skin you require would be of a heavy medium grade

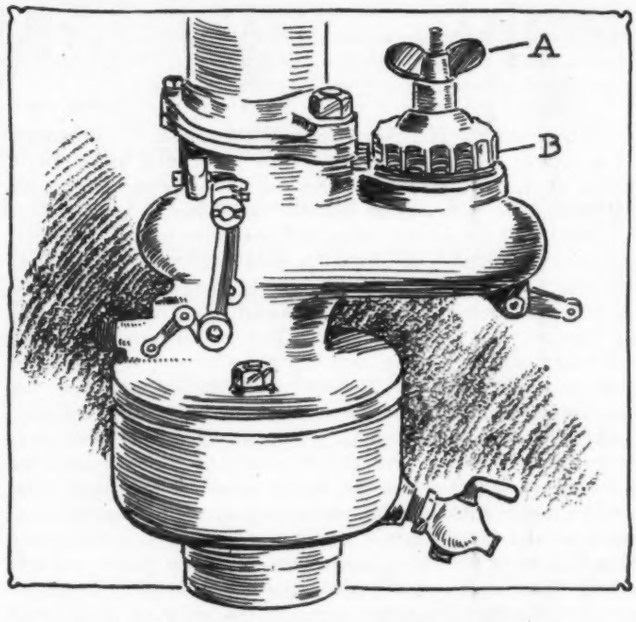

Fig. 4—Single adjustment on E. M. F. Carbureter. Wingnut A controls the air supply and mixture

oiled tanned. The domestic variety are just as satisfactory for straining purposes as are those which are imported, and besides they are cheaper.

5—Most of the skins manufactured into the so-called chamois are taken from Western sheep.

6—It would not be cheaper for you to live near the Western sheep markets, unless you were buying in extremely large quantities.

7—The Eastern markets, located in New York, Boston and Philadelphia. One of the largest manufacturers in this country is Drueding Bros., 429 Master street, Philadelphia, Pa. This concern will furnish you with any other information you desire.

8—Yes. See question 7.

9—It is sold in kips. There are thirty pieces to a kip, each piece being composed of the skin of the entire animal.

Dull Pound Given by Motor

Editor THE AUTOMOBILE:—I have a Carhart 1912, Falls motor, two-bearing cylinders 4 by 4.5 inches. When running on level and without too much gasoline car runs smoothly and with only slight vibration, but on picking up with more gasoline there is a distinct throb of dull character which comes with about every fourth explosion. I had motor overhauled to find cause, trans-

mission and differential looked over and in fact every possible thing which might cause such a throb looked into. Wiring is good and perfect, timing O. K. Can you help me out? Do you think the carbureter is at fault? It is a Stromberg. I have tried every kind of mixture. This has been going on for about 6 months, but getting worse all the time. Nothing is loose.

New York City. J. C. R.

—The fact that the noise has been increasing gradually for a period of 6 months would indicate that the trouble is in the bearings of the motor. It often happens that the bearing nearest the flywheel is worn and the wear cannot be detected because the weight of the flywheel holds the shaft down tightly to the lower bearing liner. This is indicated in Fig. 3. If you will look at the bushings in the two main bearings it will be found that the trouble is in one of these.

Bent Axle Causes Tire Wear

Editor THE AUTOMOBILE:—One front tire shows considerable wear, but the left tire shows practically none. I have the wheels toed in .25 inch in front. Tell me, if possible, which spindle arm is bent or which wheel is out of line, or how to find out the trouble.

St. Louis, Mo. J. T.

—The condition of your front axle is evidently that which is shown in exaggerated form in Fig. 5. The wheel which is in an improper position and upon which the tire wear is greatest is nearest the bend in the axle in all probabilities. It is certain that the tire which wears quickest is on the wheel that is in such position that the contact with the ground is of the sliding rather than rolling nature. This combination of sliding and rolling motion may be readily detected by examining the surface of the tire. It will be noted that the tread has the same appearance as if it were filed or had been run over the surface of a grindstone. A series of parallel lines running diagonally across the tread will be perceived upon close examination. This is due to the fact that the wheel which is out of line is being practically pushed along the surface of the ground.

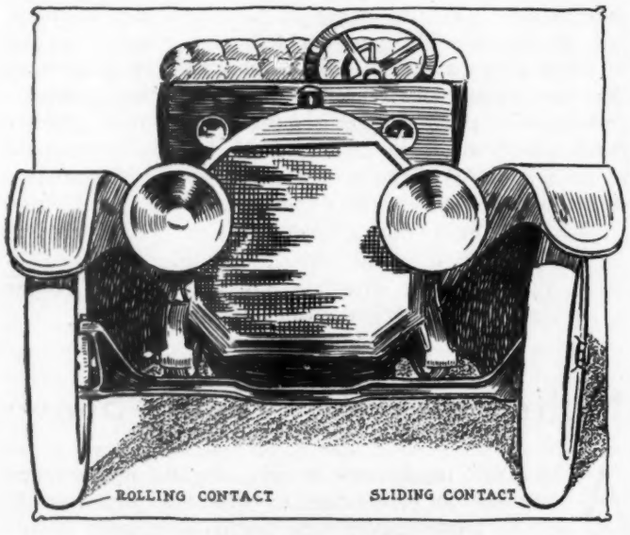

Fig. 5—Exaggerated effect of bent axle, showing how one wheel has a sliding contact with ground

The location of the bend in the axle may be found by running a straight edge along the I-beam flange. It is generally found that the bend is at the center of the axle since this is the portion which carries the greatest load. A bend in the steering knuckle is not infrequent, however, and these should be aligned also.

Another good method of procedure would be to place the car upon a floor and turn one of the wheels so that it is exactly parallel to the center line of the car. A line should be struck through the center of the wheel extending fore and aft. At the point where the wheel meets the ground a line at right angles to the fore and aft line is drawn, and extended toward the other wheel. Now from the other wheel draw a line parallel to its direction extending through the point at which the wheel touches the ground. Through the point of intersection of this wheel with the ground draw a line at right angles to the line and extend it in the direction of the first wheel. The point of intersection of these two right-angle lines will give the bend location. The bend will be found in the axle vertically above the point of intersection.

Effect of High Gas Speeds

Editor THE AUTOMOBILE: Is it true that better carburetion results from high gas velocities as compared to lower rates of flow with correspondingly high pressure? To what extent does this affect the atomization of the fuel?

Syracuse, N. Y. READER.

—The fuel economy resulting from the use of air velocities higher than the average, and thus lower pressures, is quite marked. Of course, with high charge velocities, the maximum power is not realized above a certain piston speed; but the fuel economy and efficiency will be greater within the range which the high velocity device can supply without great loss per cylinder charge. This latter fact is easily demonstrated by making two series of runs with any multiple-cylinder automobile engine. One series should be made with carbureter and manifold passages of such areas that an average charge velocity of about 8,000 feet per minute is had at a velocity speed of 1,000 feet per minute, and the other series with passages which will give the above charge velocity at between 600 and 700 feet per minute piston speed.

A comparison of the two series of runs will show that up to that piston speed at which the volumetric efficiency of the engine pumping strokes falls off because of too high a charge velocity the power deliveries are approximately equal, the fuel consumption per brake horsepower hour and the thermal efficiency have each been improved. The passages giving the above charge velocity at the higher piston speeds will permit of the development of a greater power at those speeds, and are thus superior from the viewpoints of maximum economy and efficiency at maximum output, which is the condition desired.

The points which it is desired to bring out are: That the greater the pressure drop in the passages the more perfect will be the breaking up of the fuel, the more rapid will be the agitation and internal motion in the mixture column, the greater will be the vaporization due to pressure reduction; and, as a final result, the fuel will be more thoroughly vaporized, and the mixture more homogeneous. There are in present practice several examples of the above utilization of high air velocities and low pressure in the carbureter passages. In the best of these the maximum charge velocity in the manifold and past the valves is kept down to the value given above (8,000 feet per minute); and the high velocities and low pressures are both secured in the carbureter passages through several spraying nozzles, each located in a separate, small passage.

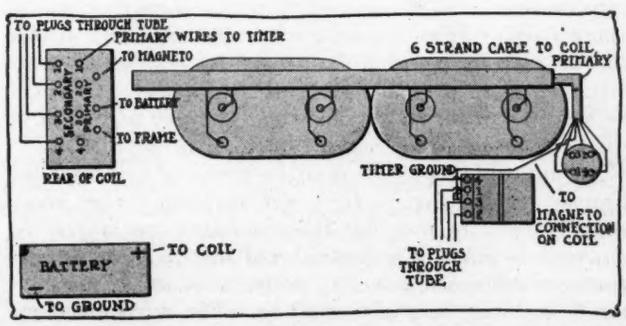

Fig. 6—Wiring diagram of the Amplex car, giving connections from battery and magneto to coil

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Kerosene or Gasoline

NOT a few owners of automobiles and motor trucks are pondering today on the solution of the fuel problem, wondering if some fine morning they will not awaken to read the announcement that from that date forward they will have to use kerosene in their cars, due to a gasoline shortage. There is no fear of such a contingency. The process of gradually introducing heavier gasoline will continue as it has in the past. It is fresh in the memory of the majority when 74 fuel was general, then came 68, then 64, then 62, then 60 and now it is a little lower. This gradual use of heavier fuel will continue, because the supply of crude oil demands it. The amount of 60 gasoline that can be made from a given quantity of crude is exactly double the amount of 64 fuel that could be produced. This means that if we demanded 64 fuel today we would be bringing about an exigency and the only way to meet it would be an unprecedented advance in price.

All automobile owners must be prepared to accept the heavier weight fuels. It is not surprising that many should object to this, but the objections can largely be passed over when it is remembered that in these heavier fuels are enough low-boiling points to insure a quick ignition and relatively easy starting. The self-starter has come at a most opportune time to aid in this work.

The Cost of Poor Roads

FROM the last report of the Department of Agriculture, Washington, D. C., it is apparent that bad roads are today playing their part in the high cost of living, because at least a considerable fraction of the cost is due to the farmer not being able to convey his products to market as rapidly as he should. Instead of keeping up with previous years the farmer is dropping slightly behind in deliveries, due to increased crops with no corresponding improvement in facilities for transportation.

The report shows that with wheat, corn, oats and barley the crop percentage delivered from the farm is less than a year ago. Taking the negative aspect of it 41.3 per cent. of the 1912 wheat crop was on the farms, not delivered, on March 1, whereas a year ago but 34.9 per cent. of the 1911 crop remained on the farm at that date. Similar figures apply to corn, oats and barley. When the actual number of bushels of each is taken into consideration, the amount remaining undelivered on the farm this year is vastly in excess of that of a year ago.

With this condition confronting him the farmer is still loath to see in a dollar-and-cent atmosphere the doctrine of good roads. He still remains content to pay 23 cents over per ton-mile for delivery of products when Europe is paying less than 10 cents.

Better rural roads would affect directly the distribution of one-third of the nation's crop, a large proportion of which, it is claimed, is wasted because of the farmer not being able to deliver it at seasons when he has the time and when the market is suitable. This failure in delivery is a question that should be considered by every automobilist. To the maker of passenger cars it means lack of capital with many farmers to purchase cars and at other times a lack of desire to purchase because of the road conditions. To the maker of motor commercial vehicles the message is equally important. Better roads would mean the ability of the farmer to purchase motor trucks for delivery work, and it is a conservative statement that the use of motor trucks and good roads would mean marketing a large fraction of the crop, so large a proportion, in fact, that the additional money secured by the farmer would, in not a few cases, go far to paying for the original truck investment.

Selling and the Truck Show

A MOTOR truck show is only of value to the truck maker in proportion to what he puts into it. The truck maker who begins preparing in advance for the show generally is not disappointed with results; whereas that maker who waits for the show and goes to it anticipating a landslide to his product generally leaves the show a most dejected person.

Public interest must be worked up previous to a passenger or truck show, and particularly with the truck show. One of the best informed authorities on the principles of salesmanship recently stated that "the best policy is to begin the advertising and selling campaigns a long time before the product is ready for delivery."

Electric Vehicle Men Hear Truck Paper

NEW YORK CITY, March 26—In spite of inclement weather, the regular monthly meeting of the Electric Vehicle Association of America, held in the rooms of the association in the Engineering Societies building last night, was well attended and great interest was shown in the paper of the evening, "Observations on Horse and Motor Trucking," by Professor H. F. Thomson, of the Massachusetts Institute of Technology.

Before Mr. Thomson took the floor President Williams called on L. J. Gerson, of the Wanamaker organization, who outlined the plan to be followed by that firm in marketing electric vehicles. Mr. Gerson stated that the company intends to sell cars in three ways:

Plan A—To sell cars outright with the manufacturer's guarantee.

Plan B—To sell cars outright and include 1 year's service at the nearest garage.

Plan C—To sell cars outright and to establish for the purchaser a private garage with all necessary equipment.

Plan B includes the delivery of the car at the residence of the purchaser at any time ordered from the garage, repair and unkeep work, charging of batteries, etc. Naturally, the cost of this service will be added to the cost of the car.

New Garage Sign Being Prepared

After discussion of this plan President Williams announced that the association is preparing a new garage sign somewhat similar to that employed by the Blue Book in that it bears the stamp of approval of the association.

Mr. Thomson then proceeded with the paper of the evening, illustrated by lantern slides showing the tabulations and charts included in the paper. Before dealing with these details, Mr. Thomson took up the truck problem in general as follows:

"The amount of work which any truck can do in a working day depends, first, upon the number of miles it is driven in a day, and second, upon the standing time or time taken in loading and unloading. The first item depends primarily upon the speed of the truck, although in congested districts the speed may be largely determined by the average speed of all the traffic using the street. But the second item, which is equally important, depends primarily upon the loading and unloading conditions. The importance of the effect of standing time upon the cost of operation is frequently overlooked; yet this time item must be carefully considered, particularly when motor trucks are used.

"As an illustration, consider a horse-drawn wagon which travels 15 miles per day but which is actually moving about 3 out of 9 working hours; the average speed of the wagon therefore being 5 miles per hour. If this wagon is replaced by an electric truck of the same carrying capacity, whose average speed under the same traffic conditions would be 10 miles per hour, then the motor truck could cover this same distance of 15 miles in $15/10 = 1.5$ hours; but if the loading and unloading conditions remain the same, the time required to perform the same service would be $6 + 1.5 = 7.5$ hours. That is, in 9 hours the motor truck could do only $9/7.5 = 1.20$, or 20 per cent. more work, although its speed is twice that of the horse wagon. However, in many short haul services the superior ability of the motor truck, in comparison with the horse-drawn wagon, to get into position where considerable backing and other maneuvering is necessary may be of equal importance with the greater speed of the motor.

"On the other hand, the long haul character of work offers to the motor an opportunity to utilize its superiority over horses with regard to greater speed and mileage capacity.

"The routing of delivery wagons, especially in parcel work, is another feature of operation which requires special attention. Two factors limit the amount of load which a wagon can handle on a single trip, first, either the bulk or weight capacity of the body, and second, the number of trips which must be made per day. The former factor is taken care of by the use of a body of suitable capacity. The latter factor very often curtails the number of deliveries made on a trip, as a wagon which consumes 2 or 3 hours in traveling to and from its delivery territory can evidently handle fewer parcels than the motor car which spends only an hour in going and returning.

"The ratio of the actual number of miles per day which a truck is driven to the number of miles per day it is capable of running, under average conditions and without interference from other traffic, may be called the mileage factor of the truck in this particular service. The greater the mileage factor in any service, the less will be the cost per unit of the service. Therefore every effort should be made to maintain a high mileage factor. To accomplish this when motor trucks are substituted for horse wagons may require considerable change in the methods previously employed in the service using horse-drawn vehicles only.

"In addition to a good mileage factor, the load-factor, or the ratio of the maximum load per trip to the capacity rating of the wagon, should also be kept as high as possible. If the vehicle does not carry its rated load on each trip, it is not performing the work with the greatest economy. In some lines where the quantity of work varies considerably with the season of the year, this may be a difficult adjustment, but in any case the size of vehicle should be carefully selected to fit the service in hand.

"The service of the hauling of freight from railroad freight houses to dealer's warehouse, or vice versa, presents a particularly complicated problem. This is due to the diverse conditions which must be dealt with, such as the railroad's organization of its freight houses, the relative locations of the stable, freight yard, the wholesale areas of the city, the fact that teams and merchandise frequently are owned by different parties, etc. In addition to the time often lost by a wagon at warehouse or freight house in receiving its load, there is also poor economy in the usual practice whereby a wagon moves with full load a comparatively small percentage of the working day."

Mr. Thomson then proceeded to elaborate upon the tabulations of cost and efficiency and to elucidate the charts and diagrams illustrating his paper.

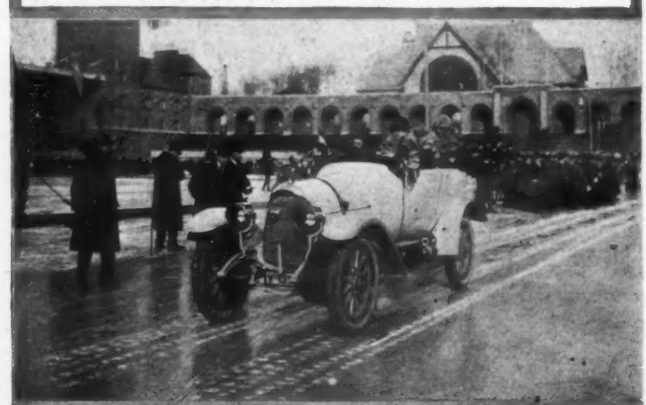
The Field of Traffic Engineering

Before opening the meeting for discussion President Williams called attention to the prominence which has been attained by the comparatively new profession of traffic engineering. He pointed out that a state committee detailed to investigate the subject found that the cost of food in New York City is increased 40 per cent. by inefficient distribution. This food, which costs $350,000,000 at the piers and terminals, represents a cost to the consumer of $500,000,000 delivered at the kitchens. President Williams suggested to Mr. Thomson that it might be possible to establish a course in traffic engineering at the Massachusetts Institute of Technology. He also drew attention to the increasing night traffic in the large cities, pointing out that this is the best way to utilize the immense investment in the way of pavement which is lying practically idle nearly 50 per cent. of the time.

An animated discussion of Mr. Thomson's paper following being opened by Mr. Cabot of Boston, followed by Messrs. Kennedy, Curtis, Lloyd, Bartlett, Howland and others. The meeting was brought to an end after Mr. Thomson had answered the inquiries made in detail.

Cars participating in the winter reliability run of the Swedish R. A. C. in the Olympic Stadium before the start

N. A. G. car, which won the Goteborg hill-climb, according to the official formula rating of the club



The German Horsch car which took third place in the reliability run, rated on the official formula

Another German car, the Opel No. 5, which ranked fourth in the reliability run as announced in the official score

Fourteen Perfect in Swedish Reliability

Five Others Perfect Mechanically But Were Penalized for Not Adhering to the Official Schedule—First American Car Ranks Sixth in Run—Another American Machine Takes Second Place in Goteborg Hill-Climb

STOCKHOLM, SWEDEN, March 6—Of the sixty-eight cars entered in the Swedish Royal Automobile Club's annual winter tour, according to the official scores which have just been made public, fourteen are credited with perfect scores. Four of these were American-made. Five other cars were perfect mechanically, that is, they were not penalized for repairs, but were given demerits for not keeping the official schedule. Two of these were American. The results of the run are given in the accompanying tabulation. The Hupmobile is the first American car, ranking sixth.

The Goteborg hill climb was won by the N. A. G., while the Overland took second place with a formula rating of 2,690. These cars were the only ones to make perfect scores, as may be seen from the tabulation.

The trip was to Goteborg and back to this city, a distance of 1,181 kilometers or 738 miles. The rigor of the climate usually renders the tour a trying test for both cars and drivers but this year the mild weather rendered it simply an enjoyable trip, the only hardship being the difficulty which the drivers experienced in keeping awake.

Stop of 12 Hours at Goteborg

A stop of 12 hours was allowed at Goteborg. There were control stations at convenient points along the route where stops could be made for fuel, oil and food without penalty. The time consumed, however, was added to the schedule time, and could not be made up en route. For example, if a car remained for an hour at a control it would not be allowed to enter the next control until an hour after its scheduled time of arrival. If for any reason the car was stopped en route, the time so consumed was added to the schedule. The car could not be stopped anywhere except within the boundaries of the control station without the time being added to the arriving schedule. As a result, every contestant endeavored to keep as closely to the specified pace as possible.

The roads in Sweden are generally better than the average road in the Middle West of the United States, and although several fairly steep and difficult hills were climbed on the route covered by the tour, they were not especially trying to either cars or drivers.

Tremendous enthusiasm was shown by the great crowd which witnessed the start of the tour from the Olympic Stadium in this city and all along the route people lined the roadways watching for the appearance of the cars.

The scenery was very fine and the participants in the tour thoroughly enjoyed themselves, although 28 hours of constant travel with meals consisting of sandwiches and the contents of vacuum bottles which could be consumed comfortably only by a juggler owing to the motion of the cars, made the arrival at Goteborg a great pleasure to some of the contestants.

After checking in at the Palace Hotel in Goteborg, the cars proceeded to a fuel station where they replenished the fuel and oil supplies. Then they were driven to a large garage where com-

petent officials were at hand to see that the cars were arranged in an orderly maner so that departure would be facilitated.

Twelve hours after checking in at Goteborg, the cars were again required to start away on the return journey. Thus many of them were on their way back to Stockholm before daybreak.

Cars which left Goteborg shortly before daybreak were scheduled to arrive in Stockholm about midnight, and at a point about .5 hour journey from Stockholm, each car was stopped opposite two red lights, which marked the starting point of a long hill. The speed of the ascent of this was timed, and figured in determining the winner of the tour, the time being taken by the observer in the car, with a stop watch specially provided for the purpose. The start was a standing one, both the car and the observer's watch, being required to start at the word "Go" from an official. At the top of the hill, which also was marked by two red lights, one on either side, the observer's watch was stopped, and as the car proceeded on its way the time was read and noted in the observer's book.

On arrival at the Grand Hotel, which also was approached through masses of people, the observer made his final notations in his book, compared watches with that of the timers, notation of any difference between the watches was recorded, then the observer handed his book over to the official and the car was dismissed. No final examination of the car was necessary, it being simply required that the car arrive at the Grand Hotel, the finishing point, under its own power.

The formula used in determining the winners of the contest is as follows:

$$R = \frac{[P\,(k+i) + 0{,}06\,S\,V^2]\,V}{0{,}01\,nD^{2/4} \times L^{0/6}}$$

P = Weight of car in tons (1000 Kg.) with equipment, passengers and full benzine tanks.
V = The average speed of the car during the tour, in meters per second. (This year = 37.53 cm per meter.)
i = The average rise of the hill in millimeters per meter.
D = Bore of cylinders in centimeters.
L = Stroke of motor in centimeters.
n = Number of cylinders.
k = Constant, varying from 12 to 30, according to the condition of the road during the tour. This is decided by the committee just before the hill climbing takes place. (In this test it was 18.) (1913.)
S = 0,8 for small racing cars.
S = 1.0 for large racing cars.
S = 1.25 for passenger cars with torpedo bodies.
S = 1.50 for touring cars with windshield and top.
S = 2.00 for closed cars.

This formula was used by Swedish R. A. C. for first time this year, and is claimed to favor small cars.

Tabulation of the Standing of Leading Cars in Swedish Run

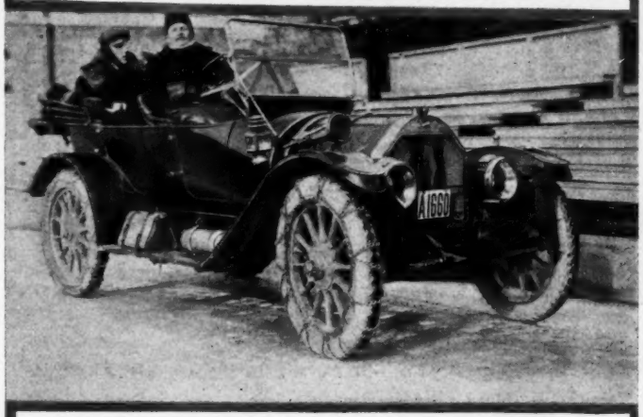
No.	Car	Repairs	Schedule	Formula Rating	Time on Kilometer Hill
19	Minerva	0	0	5714	1:31.0
34	Minerva	0	0	3649	1:37.0
8	Horch	0	0	3335	1:23.2
5	Opel	0	0	3224	1:27.4
10	Scania-Vabis	0	0	3135	1:30.4
1	Hupmobile	0	0	2791.	1:44.7
29	Pope-Hartford	0	0	2720	1:28.7
7	Fiat	0	0	2443	1:31.8
30	Overland	0	0	2429	1:24.3
35	Cadillac	0	0	2375	1:24.6
20	Fiat	0	0	2207	1:36.3
16	Mercedes	0	0	2081	1:49.4
14	Horch	0	0	2051	2:10.3
15	Rochet-Schneider	0	0	....	1:37.8
	Other Cars With Perfect Mechanical Scores				
12	Scania-Vabis	0	6	....	1:43.1
26	Overland	0	6	....	1:30.5
6	Opel	0	7	....	1:28.8
25	Horch	0	10	....	1:39.4
2	Cadillac	0	53	....	1:28.8

Standing of the Leading Cars in Goteborg Hill-Climb

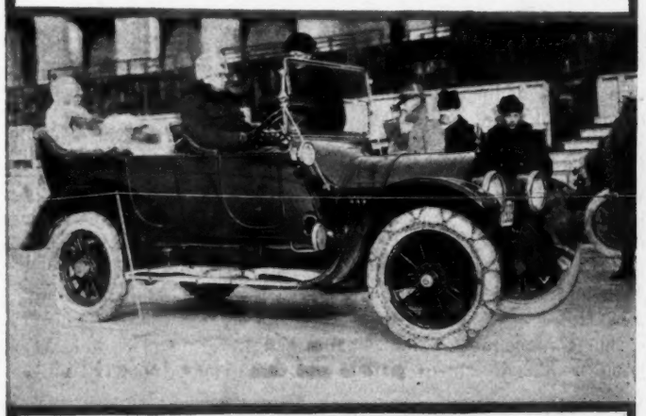
No.	Car	Repairs	Schedule	Formula	Time on Hill
61	N. A. G.	0	0	3589	2:12.4
57	Overland	0	0	2690	1:22.7
63	Hupmobile	0	38	....	1:47.2
58	Presto	3	6	....	1:45.6
52	Hupmobile	4	7	....	1:42.9
51	Overland	14	6	....	1:32.6
45	Maxwell	14	17	....	1:43.5
54	Hupmobile	19	68	....	1:42.1
66	Krit	32	151	....	2:14.5
59	Krit	33	29	....	2:15.2

*Note—Attention is called to the time made by this car on the Kilometer Hill, being much better than that of any other of the 68 cars that competed. It was also one of the only two cars to have a perfect score.

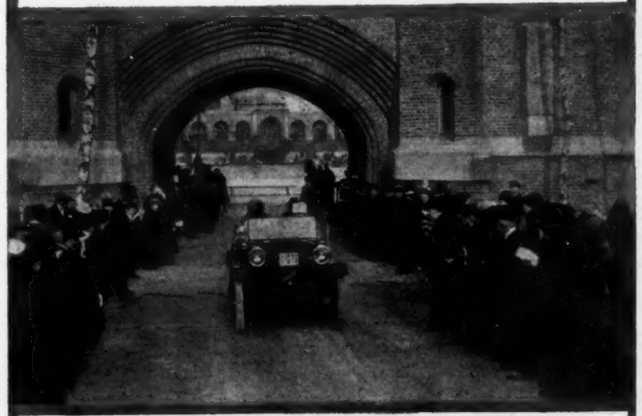
Daimler No. 4 ready to start on the winter reliability run of the Swedish Royal Automobile Club



Overland No. 57, which took second place in the Goteborg hill-climb, making the best time of all the contestants



Cadillac No. 35, which finished the reliability run with a perfect score, ranking tenth in the list



No. 1 Hupmobile, which also had a perfect score in the run, was first of the American cars, ranking sixth

The Magic Motor on Test

Test at A. C. A. Laboratory Shows Good Performance for Sleeve Motor on Open and Closed Throttle

THE A. C. A. has run a test on the Magic motor, which was described in THE AUTOMOBILE of December 19. This motor, it will be remembered, has two crescent-shaped sliding valves in the cylinder wall, driven off the cranshaft by box cams and Coventry chains. The slides extend the whole length of the cylinder and about 2 inches below, terminating in slots for engagement with the actual driving mechanism. The motor is a four-cylinder monobloc casting with a bore of 3.3125 inches and a stroke of 4.75 inches.

On one test the motor ran continuously for a period of two hours at an average speed of 1293 revolutions per minute, developing an average of 23.4 brake horsepower. The total weight of fuel used during this run was 35.6 pounds, an average consumption of 0.76 pound ber brake horsepower hour. The total weight of oil consumed was 0.6 pound, equivalent to 0.66 pint in liquid measure.

Other tests with wide open throttle at various speeds ranging from 124 to 1990 revolutions per minute were made, the motor running for five minutes at each speed. The maximum brake horsepower recorded was 32.8 at 1990 revolutions per minute. The motor was allowed to idle for two or three minutes between most of the five-minute runs.

A second series of five runs were made with the throttle approximately half open.

A third series of runs was made with the electric dynamometer driving the engine (throttle wide) in order to determine the frictional losses. The approximate indicated horsepower was determined by adding to the brake horsepower at the several speeds, the power lost in friction at the same speeds.

The motor is of the four cycle type, having four cylinders of 85 millimeter, 3.346 inch bore. The cylinders are cast en bloc with a common water jacket. The stroke is 120 millimeter, 4.72 inch. The valves are of crescent shape and are placed between the piston and the cylinder wall, there being one inlet valve and one exhaust valve for each cylinder. They are operated by a box cam which imparts a positive motion both in opening and closing. The weight of the motor, including flywheel, carburetor, magneto, inlet, exhaust and water manifolds, is 520 pounds. The weight of pistons and three rings (no wrist pin), 2.2 pounds. Weight of connecting rod, 3.7 pounds. Length of connecting rod, 11.42 inches.

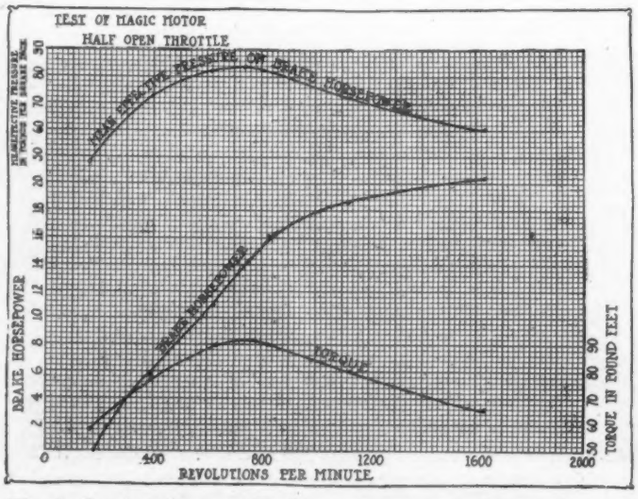


Fig. 1—Curves of mean effective pressure, brake horsepower and torque made from test on Magic motor

The clearance volume of the motor is 9.75 cubic inches and the piston displacement 41.5 cubic inches. Total piston displacement of four cylinder is 165.9 cubic inches.

A gear pump is employed to lift oil from the sump, whence it is pumped to the main bearings under pressure, and to troughs under the connecting rods in which a constant level is maintained. The big end bearings, valves and pistons are lubricated by splash.

Before any tests were made on the motor the heads of the cylinders were removed and all carbon in the combustion chamber cleaned out. Following these tests, which consumed about one week, the cylinder heads were again removed, and it was found that the cylinder walls below the junk ring and above the piston when the latter is at the top of its stroke, including that portion of the inner wall of the valves which does not at any time come into contact either with the piston or junk ring, were coated with carbon to a thickness of approximately 1-64 of an inch. The same was true of the lower edge of junk rings. The piston heads were clean in the center with some carbon deposit near the edges. The cylinder head was coated with only a very slight deposit, barely enough to completely cover the metal.

The gasoline used during the test was 63.2 degrees Beaumé,

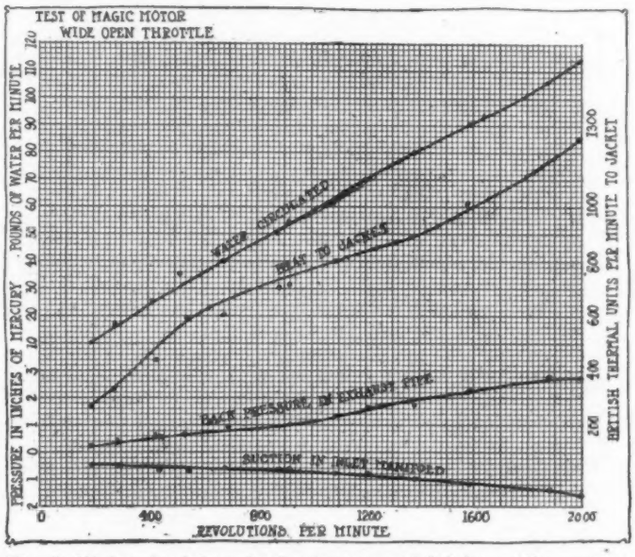


Fig. 2—Water, heat loss, back pressure and intake suction curves taken on Magic motor test

equivalent to 0.727 specific gravity. The heating value of the gasoline is taken at 20,490 British terminal units per pound in computing the thermal efficiency.

The motor was fitted with a 1 1-4 inch Newcomb carbureter which was set to give maximum power. This initial setting was not changed after starting the tests here recorded. Hot water was circulated through the carbureter jacket in all runs.

The source of ignition was a Berling magneto with spark timing lever set in each run to give maximum brake horsepower.

The motor is designed to use thermo-syphon cooling, but it was found impossible to get sufficient circulation through the long pipes and the Venturi meter used between motor and cooling tank in this test. Hence, a small gear pump was connected directly to the crankshaft and used to assist the circulation during the tests.

The exhaust from the motor was discharged into a short length of pipe to which it was connected by an 8-foot length of 1 1-2 inch flexible tubing to a 2 inch Mondex muffler. The back pressure in the exhaust pipe was measured by means of a mercury manometer connected at a point about 1 foot from the outlet of the exhaust manifold. No smoke was exhausted.

Some Methods of Testing Automobile Motors—Makers Are Coming to Realize Value of Scientific Testing

Communication From England on Accumulators As Necessary Evils Predicts Ideal Electric Lighting System

ELIZABETHPORT, N. J.—Editor THE AUTOMOBILE:—As the actual horsepower of an engine is affected by bore, stroke, number of cylinders, compression, form of compression chamber, valve timing, shape and length of gas passages, cooling facilities, location of ignition point and many other features it is very hard to form some empirical formula by which the horsepower can be accurately calculated. Possibly the formula most used is that of the A. L. A. M., namely, $\frac{Nd^2}{2.5}$ assuming a piston speed of 1,000 feet per minute.

While one regrets that there is no complete testing laboratories in the country, we feel sure that the makers are gradually realizing the value of a scientific test. A testing laboratory is to the average engineer very much like medicine, inasmuch as he knows he needs it, but hates very much to take it. The principal part of the laboratory is, of course, the dynamometer, and some of the uses of a reliable machine are carbureter adjustment, valve timing, ignition points and most economical speed of the engine, best lubricant to use and the effect of all various forms of mufflers.

There are two types of dynamometers, namely, transmission and absorption machines. The former is merely a device which registers the actual torque exerted in foot-pounds, but provides no means for creating a brake load, while the latter type not only provides a brake load, but also measures the same. Starting with the first type of braking device used, namely, the Prony brake, various advantages and disadvantages were shown on all makes and types, among them being the fan dynamometer by Franklin, Renard & Tracy, the Reilly hydraulic brake, the Garland electric dynamometer and the modern forms of electric cradle dynamometers.

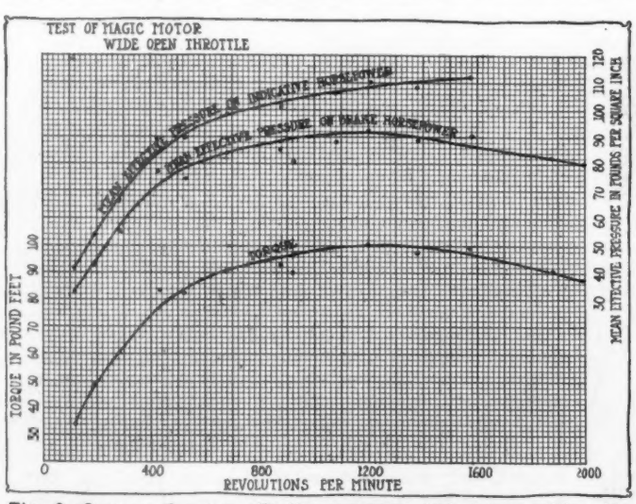


Fig. 3—Curves of mean effective pressure and torque with wide open throttle. Heat and frictional losses may be noted by subtracting brake from indicated horsepower curve.

One of the principal features in connection with the Diehl electric dynamometer system is the method of control. The company provides a control table of mahogany on which is mounted a large automobile steering wheel and three-point rotary switch. Through the steering wheel is supplied a spark and throttle control, the combination forming a standard automobile equipment. One operator can sit at this table and have every feature of the laboratory, that is, as far as horsepower measurements are concerned, under his direct control.

The methods various makers have adopted to test their engine are of interest, especially that of the German company whose factory is on the banks of a river. This concern mounts thirty or forty finished motors side by side on a scow and connects them through their own flexible joints to a line of shafts extending into the water, to each of which is keyed a propeller enabling the engine to be maintained at the most economical speed. Between the flexible shaft and propeller shaft is fixed a torsion transmission dynamometer.—P. P. DEAN.—Diehl Mfg. Co.

Motor Car Electric Lighting

LONDON, ENG.—Editor THE AUTOMOBILE:—The above matter is ever present with most motorists now, and this has been an exceedingly useful winter for testing the real driving light of electric lighting sets.

During my experiments I have found that most generators depend upon large accumulators to help them out when being used at night. Now, it seems to me that no form of electric light dynamo should be purchased by a motor car user unless the output from the dynamo is more than sufficient, when the head and other lamps are alight, to provide all the electricity required, without calling upon the accumulator.

If the accumulator is called upon, it means that if your journey is prolonged, the lights get feebler and feebler, whereas with a proper generator which gives 18 amperes one can have a whole collection of lamps alight and can use a small, and thus a light accumulator, and the accumulator, at the end of a night's run, has more electricity in than when you started.

It is well to remember that accumulators are only a necessary evil, they weigh a lot, they cost a lot. The ideal generator some day will light the lamps without any accumulator; at present our generator lights them through small, light ones—not ideal—but the best yet produced.—S. F. EDGE.—United Motor Industries, Ltd.

To Obtain Gasoline Economy

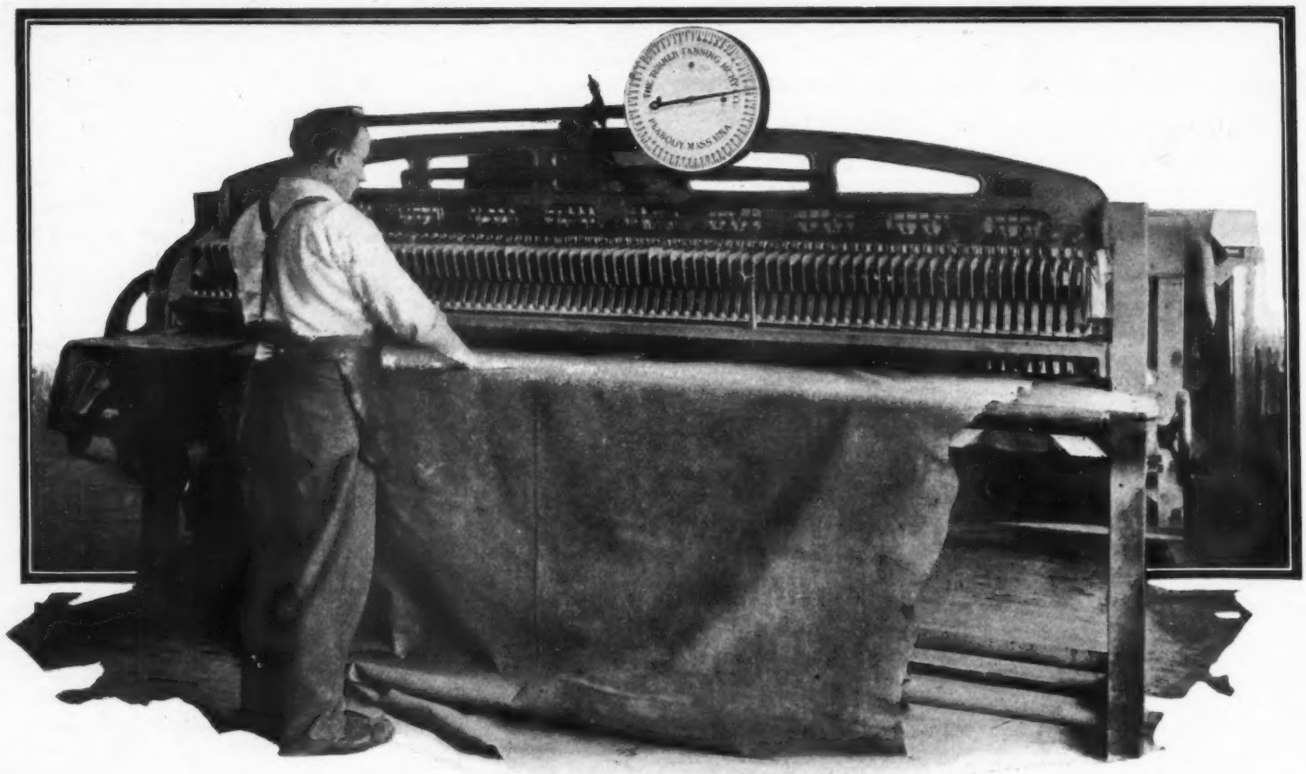
Economical operation with a six-cylinder car, or in fact any car, may be said to be attained when about 14 miles on 1 gallon of gasoline is the average over a fairly long period in the use of that car.

Gasoline economy is but one of the many economies that can and should be worked for on a car. This is one reason why it will never be possible commercially to get the maximum economy of gasoline, as to obtain that maximum, it is necessary to sacrifice a good many other details that lead to a satisfactory car.

We believe that every man selling cars should know the points that are necessary to be understood in their operation in order to obtain fuel economy.—A. HOLMES, H. H. Franklin Mfg. Co.

ROAD RESISTANCE—If a wheel rim with an axle pressure could roll on a surface without any deflection, such a condition would be rolling without resistance. A wheel rim under the pressure of the axle is deflected into the ground and leaves a path. The quantity of work required to make the path of interval length in an interval of time is the measure of work consumed by resistance.

Factory Miscellany



Special machine used for measuring the area of hides employed in upholstering cars in the Studebaker factory at Detroit, Mich.

THE above machine is used in the Studebaker factory at Detroit for measuring the area of the hides used in upholstery work. As the piece of hide passes between the rollers the fingers shown in the illustration rest upon it and are hence raised above the level at which they rest when there is no hide in the instrument. The more fingers that are raised by the hide in passing between the rollers the greater will be the area of the hide. This area is registered on the diaphragm of the recording device mounted above the fingers and directly before the operator. By knowing definitely the area of the hide the trimmers are able to base their calculations in such a way that there is very little of the hide wasted. The machine is large enough to accommodate the largest hides, and, as may be seen in the illustration, can be operated by one man who notes the readings on the dial of the area scale and marks the hide by this reading. The time required for each measurement is 100 per cent. shorter than that of measuring by manual means and the results are more accurate. This machine is made by the Turner Tanning Machinery Co., Peabody, Mass.

ENLARGE Klaxon Plant—The Lovel-McConnell Mfg. Co., Newark, N. J., maker of the Klaxon horn, recently completed extensive additions to its present factory equipment. A new building has been constructed which increases the floor space of the factory about 50 per cent., making an equal increase in the capacity. The new structure is of concrete, two stories in height, with basement, and it is connected with the main building by means of a bridge. It is used exclusively for storage and shipping. The space formerly occupied for these purposes in the main building is now devoted to manufacturing.

Chatham's $40,000 Plant—The Chatham Auto-Wheel Co., Chatham, Ont., is planning the erection of an auto-wheel plant, the estimated cost of which is $40,000.

Metz Builds Factory—The Metz Automobile Co., Waltham, Mass., plans to build a new factory, 200 feet by 200 feet, one story high, and of brick; also a boiler house, 100 feet by 60 feet.

Hendrie Buys Land—The W. C. Hendrie Rubber Co., Denver, Colo., has acquired 5 acres of land at Torrance, near Los Angeles, Cal., and will erect a large rubber manufacturing plant, estimated to cost $100,000.

Steel Wheel Company Building—The Steel Wheel Co., Bethlehem, Pa., is planning to erect a three-story factory on Broad street, that city, for the manufacture of a spring steel wheel for use on automobiles and motor trucks.

Ausman Factory in Chattanooga—The Manufacturers Assn., of Chattanooga, Tenn., is interested in the establishment of a factory to manufacture the Ausman motor truck. It is said that the plant will represent an investment of about $100,000.

Factory for Brazil—Although it was stated that the Goodyear Tire & Rubber Co., of South America, which was incorporated late last year, under the laws of Maine, with an authorized capital of $3,000,000, purposed acquiring or developing rubber plantations in Brazil, it now appears that the establishment of a factory in Rio de Janeiro was one of the objects in view.

Big Plant for Toledo—A new industrial plant, financed by the Perfection Spring Co., of Cleveland, O., but probably with a separate corporate title, and involving a building and equipment investment of many thousands of dollars, will be located in Toledo, O., in the near future. The new plant, like the parent plant at Cleveland, will manufacture automobile springs, and the product will be taken largely by the Willys-Overland Co. A site for the new spring company has been purchased and it will consist of 5 1-2 acres. The price paid for the land was $15,000.

Safe Storm Shield's Addition—The Safe Storm Shield Co., Fremont, O., is planning an addition to its plant in that city.

Weller-Thomas Builds—The Weller-Thomas Co., Zanesville, O., capitalized at $1,000,000, will build a plant to manufacture engines and automobile fire trucks.

Midland Making Alterations—The Midland Motor Co., Moline, Ill., has increased its capital stock from $100,000 to $300,000 and will make extensive improvements to its plant.

Kenyon Starts Addition—The R. L. Kenyon Co., Waukesha, Wis., manufacturing tops, curtains, cushions, etc., has commenced work on additions to cost $15,000 and increase its capacity one-third.

Want S. & M. Tire in Coshocton—A movement is on foot among the business men of Coshocton, O., to have the newly organized S. & M. Rubber Co., manufacturer of automobile tires locate its plant at that place. The promoters of the concern have visited that city and have viewed the old plant of the Premium Stamp Co., which could be easily remodeled into a rubber plant.

Eastern Rubber Secures Site—The Eastern Rubber Co., Toronto, Ont., which was recently organized to manufacture automobile tires, has secured a site of 4 acres and two manufacturing buildings will be erected. One of the buildings will be three stories high, about 250 feet by 72 feet, while the other will be one story, about 200 feet by 72 feet. In addition to these there will be suitable warehouses and a power plant.

Buys Big Factory—J. W. Murray has purchased the buildings and sites at Clay and the Michigan Central, near St. Aubin avenue, Detroit, Mich., and will begin the manufacture there of automobiles fenders and other articles in stamped steel. Machinery is being installed and operations will be begun shortly. The property is valued at $50,000. There are two brick buildings, two stories high and a frame structure on the property, giving a floor space of 22,000 square feet.

Traveler Purchases Building—The Traveler Motor Car Company, recently formed in Detroit, Mich., has purchased a two-story brick building at 1146 Grand River avenue and an adjoining lot with a 40-foot frontage. Plans have been prepared for the erection of a brick structure on the vacant lot and for the remodeling of the present building. The name of the car manufactured by this concern is the Traveler. Several Detroit business men are interested in the company as follows: J. P. Lavigne, W. K. McIntyre and F. W. Barstow.

Sanford in New Quarters—The Sanford Motor Truck Co., Syracuse, N. Y., has just completed a new factory in that city. It is 160 feet on St. Mark's Place, 138 feet on the Erie Canal, and 44 feet on West Fayette street, and is three stories high. The equipment is now practically complete and in a short time the factory will be running at full force. The ground floor will be used as a service station and as a final assembly, testing and shipping department. The second floor is devoted to the drafting room, superintendent's office, machine room and assembling. The third floor is given over to painting, body building and storage of completed trucks. The company has always made a specialty of 1-ton trucks, but now having the factory space necessary will build a 1 1-2-ton size, following the same lines as its 1-ton truck.

Shows, Conventions, Etc.

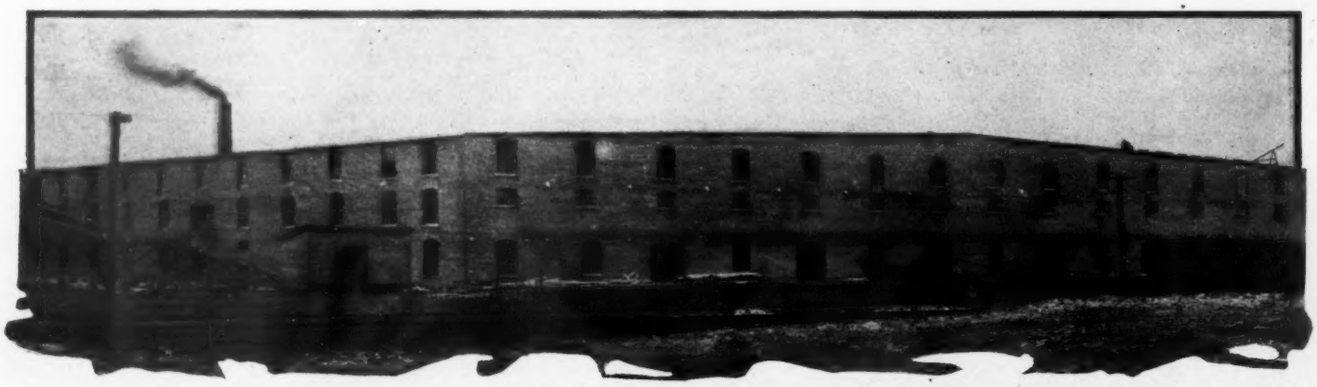
March 17-22.....Norfolk, Va., Annual Show, Armory Building, Norfolk Automobile Trade Association, Inc.
March 19-22.....Springfield, Ill., Annual Show, Springfield Commercial Association, W. L. Chapin, Mgr.
March 19-26.....Boston, Mass., Annual Truck Show.
March 20-24.....New Orleans, La., Annual Show, N. O. A. D. A.
March 24-29.....Indianapolis, Ind., Annual Automobile Show.
Mar. 27-April 3....Quincy, Ill., Mississippi Valley Automobile Show, H. F. Hofer, Director.
Mar. 31-April 5....Manchester, N. H., Automobile Show, Dealers' Association, J. H. Graham, Manager.
April 1-6.....San Francisco, Cal., Motor Truck Show, Coliseum Hall, *Motor Field.*
April 5-19.....Pittsburgh, Pa., Annual Show, East Liberty Market House, Dealers' Association.
June 5, 6, 7.....Detroit, Mich., Midsummer Meeting of Society of Automobile Engineers.
October.....Paris, France, Automobile Show, Grand Palais; 10 days.
November.....London, Eng., Annual Automobile Exhibition, Olympia.

Race Meets, Runs, Hill Climbs, Etc.

April 28-30.....Chicago, Ill., Commercial Vehicle Demonstration, Chicago Motor Club.
May 5-8.....Washington, D. C., Motor Truck Reliability, *Washington Post.*
May 14.....New York City, Start of 2-Day Hudson and Catskill Scenic Tour.
May 30.....Indianapolis, Ind., 500-Mile Race, Speedway.
July 1.....Indianapolis, Ind., Tour of Indiana Automobile Manufacturers' Association to the Pacific Coast.
July 1-16.....Winnipeg, Man., Motor Plow Competition, Dr. A. W Bell, Manager.
July 8-16.....Winnipeg, Man., Midsummer Exhibition, A. C. Emmett, Manager.
July 27-28.....Tacoma, Wash., Tacoma Road Races.
Nov. 24.....Savannah, Ga., Vanderbilt Cup Race, Motor Cups Holding Company.
Nov. 26.....Savannah, Ga., Grand Prize Race, Automobile Club of America.

Foreign

March 31.....Montevideo, Uruguay, International Competition of Agricultural Motor Vehicles.
April .....Barcelona, Spain, International Exhibition.
May .....St. Petersburg, Russia, International Automobile Exposition, Building of Michael Maneze, Imperial Automobile Club of Russia.
July 12.....Amiens, France, Grand Prix Race.
July 18-26.....London, Eng., Imperial Motor Transport Conference.
Sept. 25.....Isle of Man, International Stock Car Race.



Three-story shipping and assembly plant of the Reo Motor CarCo., Lansing, Mich. This building was completed December 2, 1912. It is 252 by 252 feet, with 190,512 square feet of floorspace and a capacity of 1,600 cars. The floors are of cement. The building is equipped with an automatic sprinkling system and is connected with the other parts of the plant by an overhead runway. Its covered platform accommodates twenty 40-foot box cars, thus making the loading capacity 120 cars per day.

American La-France truck equipped with hydraulic transmission hauling a 45-ton load consisting of a frame for the door of the new vaults of the Bank Clearing House in New York City. The frame was placed upon a four-wheel wagon which, empty, weighed 16,400 pounds. The door frame weighed 52,600 pounds. The truck was loaded with five steel plates for the vault which weighed 12,100 pounds. The truck itself weighed 9,000 pounds, so that the total load to be moved was 90,000 pounds

WHITE Buys Philadelphia Land—The White Co., Cleveland, O., has purchased a four-story concrete automobile sales building on North Broad street, Philadelphia, Pa., occupying a lot 53 feet by 200 feet, for $300,000. The structure was formerly occupied by the Packard Motor Car Co., and at present is the home of the United Motors Philadelphia Co. It is reported that the White company will have two additional stores constructed preparatory to removal from its present quarters.

Ohio Punctureless Moves—The Ohio Punctureless Tire Co., Columbus, O., has moved to 205 East Town street.

Tudhope in New Quarters—The Tudhope Motors, Ltd., Vancouver, B. C., is now located in new quarters on Granville street.

Opens New Washington Salesrooms—D. S. Hendrick & Co., Inc., has opened up new salesrooms at 1024 Connecticut avenue, Washington, D. C.

Harper Studebaker Inspector General—H. G. Harper has been made inspector general of the automobile division of the Studebaker Corp., Detroit, Mich.

Maloney Chairman Minnesota Board—J. A. Maloney has been elected chairman of the Minnesota state board of automobile examiners, Minneapolis, Minn.

Philadelphia Swinehart Agency Opened—The Swinehart Tire & Rubber Co., Akron, O., has opened an agency in Philadelphia, Pa., at 726 Main street.

Metallurgique Moves Salesrooms—The Metallurgique Motor Co., Inc., New York City, has removed its showrooms and shop to larger ones at 1876 Broadway.

Black Brothers Continental Distributors—Black Brothers have been appointed distributors for British Columbia, headquarters at Vancouver, B. C., for the Continental tires.

Sherman Elected President—J. M. Sherman has been elected president of the Safe Storm Shield Co., Fremont, O., to fill the vacancy caused by the death of J. F. Gottron.

Mars Erecting Pittsburgh Garage—G. C. Mars, Pittsburgh, Pa., is erecting a two-story brick garage at 4610 Center avenue. The building will be fireproof and is estimated to cost $12,000.

Franklin Agency Building Completed—Cramer and Bennett, recently appointed Franklin dealers, have completed the building of a new salesroom and garage at 220 Sixth street, Waterloo, Ia.

Pierce-Arrow's Brooklyn Building—The Pierce-Arrow Automobile Co. is erecting a four-story 200 feet by 205 feet building on Freeman street, Brooklyn, N. Y. It will cost approximately $300,000.

New Kelly Service Plan—The Kelly-Springfield Motor Truck Co., Springfield, O., recently announced a chain of fourteen factory branches and service stations in the principal centers of the country.

St. Louis Specialty House—A new automobile specialty house is to be opened in St. Louis, Mo. It will be known as the Daughters-King Auto Specialty Co., and will be located in the heart of the automobile row.

Rowan Velvet Shock Absorber Manager—F. J. Rowan, formerly district sales manager of the American underslung in the East, has been appointed sales manager of the Velvet shock-absorbing springs, Boston, Mass.

Form New Company—The United States Auto Lock Co., is to be the name of the new firm that is to begin operations in Findlay, O., soon. The product that is to be manufactured by the new company is a lock for automobiles.

Pacific Tire Company Transferred—The business of the Pacific Rubber Tire Co., Ltd., Vancouver, B. C., agent for Firestone tires, was taken over recently by the Pacific Rubber Tire & Repair Co., Ltd., under new management with A. L. Teetzel as president.

Larger Quarters—The Automobile Exchange, Ltd., London, Eng., has moved to 91 Great Portland street, in order to get larger quarters. With the additional room thus afforded the company is looking for more lines of automobile parts and supplies. It has the agency for several British cars and one of American make.

Motor Buses in Washington—The National Motor Transportation Co., Washington, D. C., has been given a franchise to operate a number of motor buses connecting the northwest section of Washington with the Capitol and the Union Station, via F street and Pennsylvania avenue. The cars to be used will be manufactured by the Commercial Truck Co., Philadelphia, Pa. H. H. Westcott is president.

Attempt Organization Washington Dealers—The organization of an automobile dealers' section of the Retail Merchants' Assn., is being attempted in Washington, D. C. Claude Miller has been made chairman of the automobile section. The prospectus of the association sets forth that the association will endeavor to eliminate friction and petty jealousies, encourage good business practices, cultivate a strong fraternal spirit among its members and protect them against credit losses.

New Agencies Established During the Week

PLEASURE VEHICLES

Place	Car	Agent
Aberdeen, S. Dak.	KisselKar	Aberdeen Auto & Supply Co.
Akron, O.	Hudson	Jones Auto Co.
Austin, Tex.	Oakland	W. G. Bell Motor Co.
Bemidji, Minn.	Oakland	Chas. Knopke.
Boonville, Ind.	Oakland	Auto Service Co.
Canton, O.	Oakland	Edw. Bracher & Bros.
Chicago, Ill.	Studebaker	Arnett Auto Co.
Concordia, Kans.	Sternberg	Foraker M. T. Co.
Cleves, O.	Oakland	Larson & Brightop.
Detroit, Mich.	Oakland	Walker & Hopping.
El Paso, Tex.	R-C-H	R-C-H Sales Co.
Faribault, Minn.	KisselKar	Rio Grande Auto Co.
Fergus Falls, Minn.	KisselKar	Central Auto Co.
Grand Forks, N. D.	KisselKar	H. E. Webber.
Grove City, Pa.	Oakland	V. & V. Auto Co.
Hartford, Conn.	Franklin	H. D. Murray & Son.
Holt, Mo.	Cole	M. J. Bliss.
Indianapolis, Ind.	Oakland	L. H. Riley.
Lancaster, Pa.	King	M. G. Beckner.
Lima, O.	R-C-H	S. K. Landis.
Logan, O.	Oakland	E. A. Bleck.
Miles City, Mont.	Studebaker	H. F. Sims.
Milwaukee, Wis.	KisselKar	Holmes Garage.
Missoula, Mont.	Howard	Oscar Stegeman.
Montreal, Ont.	KisselKar	F. P. Smith.
New Braunfels, Tex.	Metz	O. M. Lefebvre.
Philadelphia, Pa.	Oakland	Gerlich Auto Co.
Poplar Bluff, Mo.	Chandler	H. S. Block.
Portland, Ore.	Oakland	J. J. Van Eaton.
Portland, Ore.	Jackson	H. E. Hale.
Rapidan, Minn.	Partin	Halliwell & Co.
Redwood Falls, Minn.	R-C-H	G. H. Schendel
Seattle, Wash.	Oakland	C. D. Thompson.
Seattle, Wash.	Cartercar	Washington Cartercar Co.
Seattle, Wash.	Herreshoff	Gerlinger M. C. Co.
Seattle, Wash.	McFarlan	Gerlinger M. C. Co.
Seattle, Wash.	Pathfinder	Gerlinger M. C. Co.
Seattle, Wash.	Stoddard-Dayton	Gerlinger M. C. Co.
Sewickley, Pa.	Warren	Gerlinger M. C. Co.
Slayton, Minn.	KisselKar	P. H. Harrington.
Spokane, Wash.	Cartercar	Prescott Auto Co.
Spokane, Wash.	Garford	O. J. Olive.
Spokane, Wash.	Mitchell	Mitchell-Lewis & Staver Co.
Spokane, Wash.	Overland	H. J. Olive.
Stanford, Ky.	Oakland	H. C. Carpenter.
Stockton, Wash.	Mitchell	J. C. Skinner.
Syracuse, N. Y.	Peerless	W. R. Mason.
Tacoma, Wash.	Henderson	H. W. Doherty.
Terry, Mont.	R-C-H	E. W. Lamb.
Vancouver, B. C.	Imperial	Hoffmeinster Bros.
Vesper, Kans.	R-C-H	W. M. Middlekauff.
Virginia City, Mont.	KisselKar	C. H. Buford.
Walhalla, N. Dak.	KisselKar	Geo. W. Delisle.
Warren, Minn.	KisselKar	O. H. Taralveth.
Washington, D. C.	Cutting	Cutting Motor Sales Co.

ELECTRIC VEHICLES

Place	Car	Agent
Walla Walla, Wash.	Baker	City Garage.
Washington, D. C.	Waverley	Waverley Sales Co.

COMMERCIAL VEHICLES

Place	Car	Agent
Baltimore, Md.	Gramm	Cole Sales Co.
Baltimore, Md.	Reo	R. H. Croxton.
Milwaukee, Wis.	Commerce	R. D. Rockstead.
Seattle, Wash.	Federal	Gerlinger M. C. Co.
Seattle, Wash.	Menominee	Gerlinger M. C. Co.
Seattle, Wash.	Standard	Gerlinger M. C. Co.

Opens Garage in Sharon—A garage has been opened on Dook street, Sharon, Pa., by James Wilson.

Pressman and Meeley's Store—H. Pressman and G. G. Meeley have opened a tire store in New York City at 1659 Broadway. Mr. Fairman is manager.

Buys Syracuse Garage—J. W. Lee, of the Overland-Syracuse Co., Syracuse, N. Y., has bought the garage and salesroom formerly occupied by the United Motor Syracuse Co.

Railroad Adopts Motor Car—The Chicago, Milwaukee & St. Paul road will put in operation in the vicinity of the Twin Cities gasoline-electric cars covering 132 miles of road.

New Walpole Tire Manager—I. W. Penniman is now the New England sales manager for the Walpole Tire & Rubber Co., with sales offices at 757 Boyston street, Boston, Mass.

Sewell Cushion Opens Branch—The Sewell Cushion Wheel Co., Detroit, Mich., will shortly open a branch in New York City. W. E. Kretschmar from the factory will be manager.

Kilborn G. M. C. Branch Manager—E. J. Kilborn has been appointed general manager of the General Motor Truck Co.'s branch in Chicago, Ill., with headquarters at 2241 Wabash avenue.

Motordome to be Built—The Pittsburgh, Pa., Motordome Co., composed of local men is planning to build a motordome, the lumber for which is under contract. The site will be chosen in the near future and work begun by April.

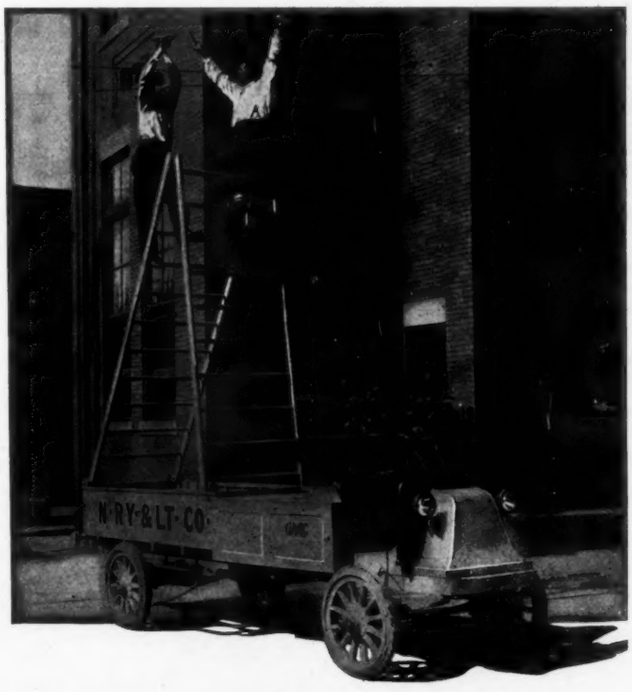
Dustin Retail Sales Manager—The American-Marion Sales Co., 1896 Broadway, New York City, distributor of the American underslung and Marion cars has secured the services of L. N. Dustin, in the capacity of retail sales manager.

Large Chicago Garage Opened—What is said to be the largest garage on the west side of Chicago, Ill., was recently opened by the Jackson Boulevard Garage Co. The garage is of fireproof construction, with a storage capacity of forty cars.

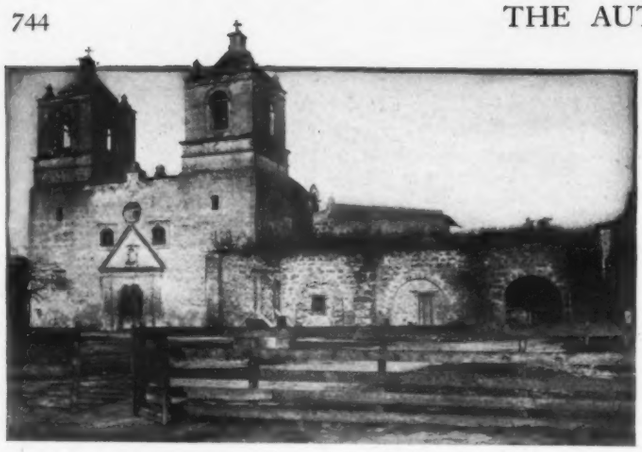
Garabrant District Sales Manager—W. W. Garabrant has been appointed district sales manager by the Franklin Automobile Co., Syracuse, N. Y., for the states of Nebraska, Kansas, Missouri and Oklahoma. He will make his headquarters at Kansas City, Mo.

City's Largest Garage—Walter Haefeli has filed for A. R. E. Pinchot, owner, plans for one of the largest automobile garages in New York City. It will be located on the north side of Sixtieth street, east of Columbus avenue, running through the block to the south side of Sixty-first street. It will have a frontage of 18 feet on Sixtieth street and 100 feet on Sixty-first street, being fireproof. The cost has been estimated at $325,000.

Norway as Automobile Market—There is absolutely no demand in Norway for electric automobiles for either pleasure purposes or commercial uses. The market for gasoline automobiles is limited, but better in Christiania than in all the rest of Norway. The number of automobiles registered in Christiania is only about 600, and in all the rest of Norway about 300. Of the 550 or 600 gasoline cars used for pleasure purposes in Norway, it is estimated that about 300 are of American manufacture. There is a good opportunity for the sale of high-priced cars from America.



It is in emergencies that motor vehicles are at their best, and this fact has led many street railway companies to adopt the commercial vehicle for emergency wagons. The G. M. C. electric machine shown in the illustration is used in this capacity by the Nashville Railway & Light Co., Nashville, Tenn., and has shown much greater economy and efficiency than could be obtained with a horse-drawn wagon



Front View of the Mission Concepcion near San Antonio

Starter Company Opens—The Pennypacker Engine Starter Co., recently opened a service station at 2210 South Main street, Los Angeles, Cal.

Alco Ends Trip—The Alco motor truck of John Lucas & Co., Philadelphia, Pa., arrived at Pittsburgh, Pa., on March 22, finishing a 400-mile run.

Latham Manager Frisco Branch—Bert Latham has been appointed manager of the San Francisco, Cal., branch of the Simplex-Mercer Pacific Coast Co.

Baltimore Buys Apparatus—The Lord Baltimore Motor Car Co., Baltimore, Md., sold two trucks to Baltimore city for use in the city fire department.

Edmonton Adds Fire Apparatus—Twelve pieces of modern apparatus will be added to the fire-fighting equipment by the municipality of Edmonton, Alta.

Fleming Joins Studebaker—Treasurer A. R. Erskine of the Studebaker Corp., Detroit, Mich., announces the appointment of C. D. Fleming as assistant to the treasurer.

Alabama Invites All Governors—Alabama will invite every governor in the United States to attend the meeting of the National Good Roads Federation in Birmingham, Ala., April 24.

Michigan Service Station Established—A garage and service station has been established at 3435 Lullow street, West Philadelphia, Pa., by the local branch of the Michigan Motor Car Co.

Anthony Maxwell Comptroller—W. M. Anthony, who represented the receivers of the old U. S. Motors Co., Tarrytown, N. Y., has arrived in Detroit, Mich., where he will join the Maxwell Motor Co., as comptroller.

Phillips Promoted—F. R. Phillips has been promoted to the position of assistant to the vice-president of the International Motor Co., New York City, with headquarters at Broadway and Fifty-seventh street, that city.

Standard Bearing's Indianapolis Office—The Standard Roller Bearing Co., Philadelphia, Pa., has opened an office in Indianapolis, Ind., with L. M. Watkin, Jr., in charge. The office is located in room 1201 State Life Building.

Motometer in Atlanta—The Motometer Co., Inc., New York City, maker of radiator heat and indicators known as Motometers, has appointed the Johnson Gewinner Co., 124 Peach street, Atlanta, Ga., as distributor of its product.

Establishes Clintonville Garage—W. B. Stevens has formed a company with the backing of Clintonville, Wis., business men and has established a garage, repair shop and salesroom. The name of the firm will be the Star Garage Co.

Open Second-Hand Store—R. A. Kloch and John Dietrich have formed the firm of Kloch & Dietrich and have opened a store at 1333 Fourteenth street, N. W., Washington, D. C., for the sale of second-hand cars, and a line of accessories.

Frisco Wrecking House Opened—Pioneering the way in a new industry, the Auto Exhibit and Supply House, an automobile wrecking house of Los Angeles, Cal., has opened its San Francisco quarters at 465 Golden Gate avenue, with J. C. Porter in charge. This firm handles all parts and accessories for every make of automobile.

McLaughlin Makes Appointments—J. W. McLaughlin, California distributor of Dayton trucks, has recently made the following appointments: H. L. Miller has charge of the Los Angeles branch and J. M. Lawrence of San Jose has to take care of the counties of Santa Clara, Monterey, San Mateo and San Cruz, with headquarters at San Jose.

San Antonio's Picturesque Old Missions

¶ One of the prime factors which has led to the construction of splendid automobile roads radiating in all directions from San Antonio and extending to the limits of the Bexar county line, and in some instances through adjoining counties, has been the recognized necessity on the part of the people of San Antonio to provide a means of affording pleasure for the great number of winter tourists who visit there each year. Since the erection of splendid hotels in the city and the creating of other essential requirements that go to make up an attractive resort for pleasure seekers, San Antonio's tourist business has increased enormously. It is rapidly becoming the equal of noted resorts in California and Florida. Many of the winter visitors from the North bring with them their automobiles and obtain keen enjoyment in their daily outings over the system of good roads that has been constructed throughout the

Quadrangle and old stone tower at Fort Houston

Automobile Incorporations

AUTOMOBILES AND PARTS

ASHEVILLE, N. C.—Lyerly Motor Co.; capital, $15,000. Incorporators: D. K. Lyerly, W. K. Lyerly, P. H. Lyerly.

BOSTON, MASS.—Androscoggin Motor Co.; capital, $10,000. Incorporators: Geo. A. Pulsifer, William G. Renwick, Gilbert Hodge, Jr.

BROOKLYN, N. Y.—John Hann Co.; capital, $25,000; to manufacture gasoline engines, machinery, etc., and to operate general machine shop. Incorporators: John Hann, Daniel Douglass, Francis J. Waters.

BROOKLYN, N. Y.—F. & P. Auto Transportation Co.; capital, $70,000; to manufacture and trade in vehicles propelled by gas, electricity, etc. Incorporators: W. O. Goddard, G. A. Logan, F. K. Fairchild.

CONNERSVILLE, IND.—Central Car Co.; capital, $100,000; to manufacture motor-driven and other vehicles. Incorporators: Jos. E. Huston, John W. Burke, R. T. Huston.

CONNERSVILLE, IND.—Howard Motor Car Co.; capital, $10,000; to manufacture automobiles and accessories. Incorporators: Guilford C. Babcock, Harry Tuttle, Clarence L. Millard.

DENVER, COLO.—Washington Motor Car Co.; capital, $300,000. Incorporators, W. F. P. Lofland, W. I. N. Lofland, J. S. Collins, Jr.

DETROIT, MICH.—Detroit Trailer Co.; capital, $5,000; to manufacture automobile trailers and accessories. Incorporators: Stanley R. DuBrie, William H. Turner, A. C. Turner.

DETROIT, MICH.—Tribune Motor Co.; capital, $10,000. Incorporators: L. G. Hupp, Geo. J. Baker.

INDIANAPOLIS, IND.—Fort Wayne Motor Sales Corp.; capital, $10,000. Incorporators: Carl J. Weber, William J. Hess, William H. Bensman, Thomas McConnell, Charles Gale.

LYNN, MASS.—Atlantic Auto Co.; capital, $10,000. Incorporators: Chas. J. Goldman, Wilbert A. Bishop.

NEW YORK CITY.—Latham Phelps Co., Inc.; capital, $50,000; to deal in motor vehicles and engines. Incorporators: Charles H. Latham, Nellie B. Latham, Harry E. Phelps.

PINEVILLE, KY.—Cumberland Motor Co.; capital, $50,000. Incorporators: N. J. Weller, M. J. Moss, A. W. Bryant, John A. Pitman.

PITTSBURGH, PA.—Gibson Motor Car Co.; capital, $3,000,000; to trade and deal in engines and motors and necessary equipment for them. Incorporators: J. H. Mahoney, E. D. Johnson, C. E. Gibson.

SAVANNAH, GA.—Griffith Auto Co.; capital, $10,000. Incorporators: C. M. Griffith, J. H. Brown.

SPRINGFIELD, MASS.—Springfield Buick Co.; capital, $15,000. Incorporators: Charles T. Nelson, David Roberts, Dr. T. F. O'Loughlin.

TRENTON, N. J.—Brocks Garage, Inc.; capital, $100,000; to do a general automobile business. Incorporators: J. L. Brock, H. K. Brock, H. P. Brock.

TROY, O.—Hobart Mfg. Co.; capital, $1,600,000; to manufacture motor-driven machinery of all kinds. Incorporators: H. L. Johnson, W. E. Boyer, E. E. Edgar, W. W. Cope, J. M. Spencer, J. S. Combs.

GARAGES AND ACCESSORIES

ALEXANDRIA, VA.—Imperial Motor Tire Company; capital, $100,000. Incorporators: G. D. Gehaghtly, E. A. Garlock, M. T. Wiggins.

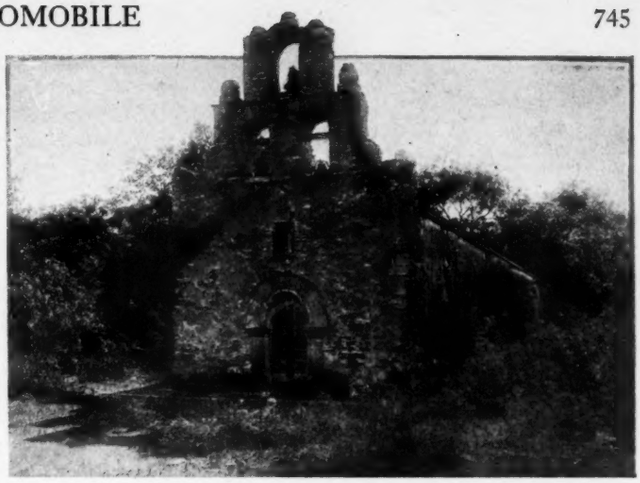
AUGUSTA, GA.—Harbak Auto Heater Company; capital, $300,000. In-

Appeal to Many Automobile Tourists

county and to adjacent towns. The automobile loop highway, as it is termed, which extends almost around the city, is the favorite route for pleasure seekers. There are a number of points of historic interest situated adjacent to the city and upon the routes of these automobile highways.

¶The chain of missions that extends from the city south along the San Antonio River for about 15 miles is an unfailing object of interest to many of the automobilists. Beginning with the Alamo, which is situated upon the beautiful plaza of that name and which is often referred to as the "cradle of Texas liberty," there are splendid streets and roads leading to the next historic edifice, Mission Concepcion, about 3 miles south of the town. A few miles below that is situated Mission San José, and a little further down the river is Mission San Juan. These ancient structures are in a remarkably fine state of preservation, considering that their foundations were laid nearly two centuries ago.

San José Mission, several miles south of San Antonio



The San Juan Mission has an aspect of antiquity

Automobile Incorporations

corporators: C. L. Andrews, L. J. Colcman, R. S. Buzzell, E. M. Hussey, E. M. Leavitt.

CHICAGO, ILL.—Auto Combination Manufacturing Company; capital, $50,000; to manufacture automobile supplies and equipment. Incorporators: H. M. Show, G. W. Nevine, W. J. Liddy.

CHICAGO, ILL.—Logan Square Auto Supply Company; capital, $10,000; to manufacture automobile supplies. Incorporators: Otto E. Schmidt, August J. Schmidt, Martha Perl.

CLEVELAND, O.—Standard Shock Absorber Company; capital, $100,000; to manufacture and deal in shock absorbers and various automobile accessories. Incorporators: C. D. Sward, William Leary, S. A. McGill.

FINDLAY, O.—United States Auto Lock Company; capital, $15,000; to manufacture and deal in combination and other locks and deal in novelties and accessories of all kinds. Incorporators: J. S. Van Tassell, E. B. Brokaw, J. H. Macklin, J. R. Harnahan, George F. Burnap.

INDIANAPOLIS, IND.—Diamond Specialty Company; capital, $40,000; to manufacture metal polishes, cleansing compounds and soaps. Incorporators: John G. Wood, Horace F. Wood, William N. Harding, W. N. Harding.

INDIANAPOLIS, IND.—Pumpelly Battery Company; capital, $20,000. Incorporators: Sidney W. Elston, Harry Murphy, James K. Pumpelly.

NEWARK, N. J.—Automobile Leather Manufacturing Company; capital, $150,000; to manufacture leather of all kinds. Incorporators: W. A. Smith, F. I. Ennis, T. G. Woodruff.

NEW YORK, N. Y.—Approved Auto Specialties Company; capital, $10,000; to deal in automobile accessories. Incorporators: Katherine D. Brandreth, John B. Brandreth, Edward C. Phelps.

NEW YORK CITY.—New York & New Jersey Seaton Wheel Company; capital, $350,000; to manufacture Seaton spring wheel for automobiles. Incorporators: John T. Landis, William C. Mack, William T. Rainey.

RACINE, WIS.—Wisconsin Electric Company; capital, $50,000; to manufacture a line of electrically operated labor saving devices and instruments. Incorporators: Louis H. Hamilton, Chester H. Beach.

STEUBENVILLE, O.—Ohio Valley Rubber Company; capital, $50,000; to manufacture and deal in rubber and mechanical goods of all kinds, including automobile supplies and accessories. Incorporators: C. L. Williams, Howard L. Wickersham, Roy D. Lloyd, Edward L. Parker, John C. Smythe.

SUFFOLK, VA.—Suffolk Garage & Machine Company; capital, $15,000. Incorporators: B. E. Parker, C. C. Clark, G. L. Bower.

UTICA, N. Y.—Divine Tire Company; capital, $225,000; to deal in tires. Incorporators: C. W. Wicks, A. J. Eckert, B. H. Divine.

CHANGES OF NAME AND CAPITAL

CLEVELAND, O.—Chandler Motor Car Company; capital increased from $1,000 to $425,000.

DETROIT, MICH.—Thompson Auto Company; capital increased from $10,000 to $20,000.

KENTON, O.—Kenton Drop Forge & Manufacturing Company; capital increased from $25,000 to $150,000.

LOUISVILLE, KY.—Transit Motor Car Company; change of name to Transit Motor Truck Company.

WABASH, IND.—Service Motor Car Company; capital increased from $125,000 to $250.000.

Garage in San Bernardino—F. T. Hendee has organized the Perkins-Hendee Garage Co., San Bernardino, Cal.

Merrill Manager Veerac—Frank Merrill, chief engineer for the Veerac Motor Co., Anoka, Minn., has been made general manager.

High School Studies Automobiles—The Manual Arts High School of Los Angeles, Cal., has taken up the study of motor cars and parts.

Borovitz Croxton Chief Engineer—Joseph Borovitz has been appointed chief engineer and factory manager of the Croxton Motor Car Co., Washington, Pa.

Gail Hamilton in Charge—Gail Hamilton has been placed in charge of the new department for used cars, opened by the Howard Automobile Co., Los Angeles, Cal.

Burlington Garage Enlarged—The Burlington Automobile Supply Co., of Burlington, Wis., is remodeling its garage and store and will gain considerable more floor space.

Used Car Department Established—The Hawley-King Co., Los Angeles, Cal., has decided to run a used car department in conjunction with the salesroom at 1027 South Olive street.

Federal Tire Agency Moves—The Federal Tire & Rubber Co., Detroit, Mich., has removed to 846 Woodward avenue, where a service station, salesroom and store rooms will be conducted.

Milwaukee County Wants Automobile—The county of Milwaukee, Wis., will soon be in the market for a touring car for the county coroner, to cost not more than $1,200. The purchase will be made in open market without call for bids.

By Way of Correction—Under the heading of New Agencies Established During the Week in the March 13 issue of THE AUTOMOBILE G. M. Redding was given as distributor of the Haynes cars in New York City, which should have read Utica, N. Y.

Fire Apparatus for Oshkosh—The piece of motor fire apparatus recently ordered by the common council of Oshkosh, Wis., and which inaugurates the use of motor equipment for the fire department of Oshkosh, is being built by the Kissell Motor Car Co., Hartford, Wis., at a cost of $3,500.

Mulkern Garage Company Organized—Frank Mulkern, Milwaukee, Wis., has organized the Mulkern Garage Co. The garage has a storage capacity of 100 gasoline and 150 electric cars. It has dimensions of 216 feet by 60 feet and is two stories high. Both floors are obstructed only by four columns.

Towson Installs Fire Trucks—Combination chemical fire engines and hose trucks have been put in service in Towson and Highlandtown, Md., making seven pieces of fire apparatus used by the county fire department. The new apparatus was bought from the American La France Co., Elmira, N. Y., and cost $9,500 each.

Drawback for Reo—The treasury department at Washington, D. C., has made a ruling to the effect that drawback will be allowed under section 25 of the tariff act of 1909, and the regulations promulgated thereunder, on automobiles manufactured by the Reo Motor Car Co., Lansing, Mich., with the use of imported tires. The drawback allowance shall not exceed four tires to each automobile exported. The maker's sworn statement has been filed with the collector of customs at Detroit, Mich.

Patents Gone to Issue

SPRING WHEEL CONSTRUCTION—In which a special tire is mounted on flanges extending from the inner fixed rim, radially arranged springs between the spokes forming the resilient members.

In this design the outer rim O, having inwardly extending flanges, slides on flanges fitted to the inner rim or felloe I. The driving strain between the two components is taken by cross pins furnished with rollers which slide in radial slots in the flange of the tire. Plungers P pressed outwardly in a radial direction by helical springs are arranged between the spokes; these plungers have stems S and heads H, both bored with passages for the transfer of a lubricant which is supplied from a cylindrical receptacle C. Helical springs force the plungers P outwardly, their heads H bearing against O, around which a tread member is arranged.

No. 1,056,167—to Norman Gratz, Boise, Idaho. Granted March 18, 1913; filed February 6. 1912.

Automobile Wheel and Tire—The tire is a transversely contractible ring governed by pinions operable from outside the tire.

This patent refers to a wheel construction, Fig. 2, in which a rim R is equipped with a contractible, transversely divided ring R1 which encircles it. The opposite ends of the tire ring R1 are provided with inwardly extending brackets, each of which has a transversely threaded hole. A rod has oppositely threaded portions fitted into these holes. A pinion P is secured to the rod, being rotatable therewith; a yoke Y is equipped wih two arms arranged at opposite ends of P and formed with holes in which the rod is rotatably mounted. A second pinion Q meshes with the first-named pinion, being rotatable in the yoke Y.

No. 1,056,591—to William E. Schilling, Kansas City, Mo. Granted March 18, 1913; filed June 12, 1911.

Automobile Engine Starter—Including a flywheel mounted loosely on the crankshaft and capable of being clutched to the same.

Fig. 3 shows the subject-matter of this patent, consisting of a starter mechanism. The latter is composed of a flywheel W journaled on the crankshaft S so as to be rotatable independently of the same and carrying on its rim portion the rotary element R of an electric motor. The crankcase K supports the fixed polepieces F arranged inside the rotatable armature R which is carried by W. It is clear that by energizing the armature R the wheel E is rotated. By engaging the clutch C on the shaft S with the wheel W, the latter is connected to S and the shaft is rotated, starting the automobile engine.

No. 1,056,417—to Percy W. Hodgkinson, Rochester, N. Y. Granted March 18, 1913; filed February 3, 1912.

Automobile Jack Design—Consisting of arms which are operated through a toggle mechanism to lift the wheels.

The jack described in this patent consists of a pair of arms A, each pivoted at one end and so arranged that they engage the automobile axles just inside of its wheels. Links L are pivotally connected with the arms A at a point removed from their free ends, part of the links extending beyond the arms. The links are part of a toggle mechanism, and means M are provided for the purpose of operating the toggle.

No. 1,056,235—to Hosea S. Tuttle, Minneapolis, Minn. Granted March 18, 1913; filed April 3, 1912.

Automobile Horn—Being of the bulb-and-reed type but being operable by means of a pump driven from the flywheel of the motor.

The horn H, Fig. 5, comprises an air bulb, a reed and a pipe connecting these two parts. A pump P is driven by the flywheel W, if brought into frictional engagement with it by suitable means operated by the driver. The pipe Q is so connected to the pump and the first-mentioned pipe, that it conveys air from the former to the latter, through which it is forced into the horn H, sounding the same.

No. 1,056,265—to Amedee Couesnon, Paris, France. Granted March 18, 1913; filed February 7, 1912.

Internal-Combustion Engine—Consisting of a cylinder having two sections of different widths, one of which serves as compression chamber.

This patent refers to an internal-combustion motor design, Fig. 6, which comprises a cylinder formed with a wider diameter at its lower end, to provide a compression chamber, and with a narrower above, to give an explosion space. An exhaust port E is formed in the explosion chamber and a gas inlet port A as well, A being located higher than E. An air passage A1 through which carbureted air is taken into the cylinder is formed in the wider section of the cylinder, which is connected to the upper portion by a passage controlled through a rotary valve V. A differential piston fitting the two cylinder sections is formed with an upper half U and a lower one L, and it is obvious that on each upstroke there is compression in the wider cylinder section and exhausting in the narrow section, while on the downstroke there is a power stroke in the explosion chamber and a suction stroke in the wide-diameter cylinder section. In this way a two-stroke cycle engine is obtained in which crankcase compression is avoided.

No. 1,056,690—To Frederick O. Kilgore, Somerville, Mass. Granted March 18, 1913; filed May 28, 1912.

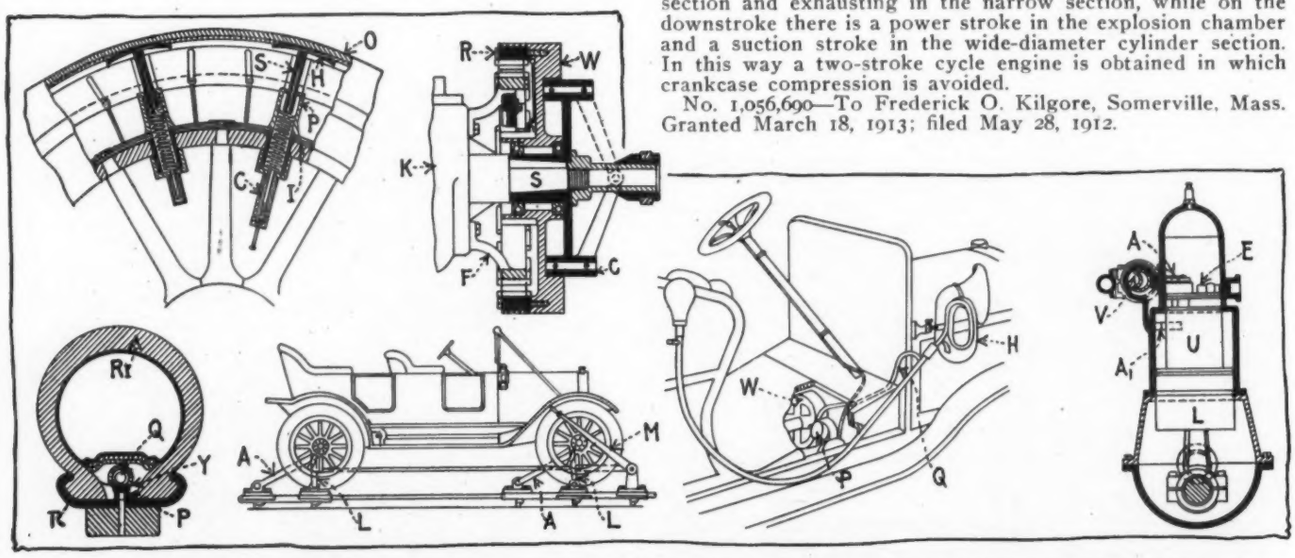


Fig. 1—Gratz cushion-tired wheel. Fig. 2—Schilling contractible-tire wheel. Fig. 3—Hodgkinson electro-mechanical starter. Fig. 4—Tuttle automobile jack. Fig. 5—Couesnon flywheel-operated reed-horn. Fig. 6—Kilgore internal-combustion engine